

ADVANCED FINANCIAL MANAGEMENT (AFM)

FINAL

STUDY NOTES



The Institute of Cost Accountants of India

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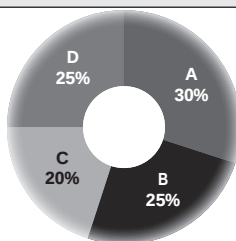
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Syllabus

Syllabus Structure

A	Financial Markets and Institutions	30%
B	Financial Risk Management	25%
C	Security Analysis and Portfolio Management	20%
D	Investment Decisions	25%



ASSESSMENT STRATEGY

There will be written examination paper of three hours.

OBJECTIVES

To provide expert knowledge on setting financial objectives and goals, managing financial resources, financial risk management, thorough understanding of investment portfolios and financial instruments.

Learning Aims

The syllabus aims to test the student's ability to :

- Evaluate the role of agents and instruments in financial markets
- Interpret the relevance of financial institutions
- Analyze the degree of risk for its effective management
- Advise on investment opportunities

Skill set required

Level C: Requiring skill levels of knowledge, comprehension, application, analysis, synthesis and evaluation.

Section A : Financial Markets and Institutions	30%
1. Agents in Financial Markets	
2. Financial Market Instruments	
3. Commodity Exchange	
4. Infrastructure Financing	
Section B : Financial Risk Management	25%
5. Capital Market Instruments	
6. Types of Financial Risks	
7. Financial Derivatives as a tool for Risk Management	
8. Financial Risk Management in International operations	
Section C : Security Analysis and Portfolio Management	20%
9. Security Analysis & Portfolio Management	
Section D : Investment Decisions	25%
10.(a)Investment Decisions under uncertainty	
(b) Investments in advanced technological environment	
(c)International Investments	

SECTION A: FINANCIAL MARKETS AND INSTITUTIONS

[30 MARKS]

1. Agents in Financial Markets

- (a) Reserve Bank of India; SEBI; Banking Institutions
- (b) Non-Bank Financial Corporation's (NBFCs)

- (c) Insurance, Pension Plans and Mutual Funds

2. Financial Market Instruments

- (a) Call money, Treasury Bills, Commercial Bills, Commercial Paper; Certificate of Deposits, Government Securities and Bonds, Repo, Reverse Repo and Promissory Notes
- (b) Futures, Options, other Derivatives
- (c) Money Market Instruments & Mutual Funds

3. Commodity Exchange

- (a) Regulatory Structure, Design of markets
- (b) Issues in Agricultural, Non-Agricultural Markets, product design, contract specifications, spot price and present practices of commodities exchanges
- (c) Intermediaries, Clearing house operations, risk management procedures and delivery related issues
- (d) Issues related to monitoring and surveillance by exchanges and regulator, Basic risk and its importance in pricing
- (e) Commodity options on futures and its mechanism

4. Infrastructure Financing

- (a) Financial objectives, policies on financing, investments and dividends. Financial forecasting, planning and uncertainties, interest rates, inflation, capital gains and losses exchange control regulation, government credit policies and incentives statistics on production, price indices, labour, capital market based on published statistical data
- (b) Internal source, retained earnings, provisions etc, Issues in raising finance, legal form of organisation, provisions of the companies Act, control of capital issues. Short term sources : Trade credit, factoring, Bill of exchange, Bank Loan, Cash credit, overdraft, public deposit, SEBI regulations, primary and secondary markets
- (c) Securitization, Viability, GAP Funding

SECTION B: FINANCIAL RISK MANAGEMENT

[25 MARKS]

5. Capital market instruments

- (a) Primary and secondary markets and its instruments
- (b) Optionally convertible debentures, Deep discount bonds
- (c) Rolling settlement, Clearing house operations
- (d) Dematerialization, Re-materialization
- (e) Depository system
- (f) Initial Public Offering (IPO)/ Follow on Public Offer (FPO); Book Building
- (g) Auction, Insider trading
- (h) Credit rating- objective, sources, process, credit rating agencies in India

6. Types of Financial Risks

- (a) Asset based risk , Credit Risk, Liquidity Risk, Operational Risk
- (b) Foreign investment risk, Market Risk

7. Financial Derivatives as a tool for Risk Management

- (a) Forward & Futures – meaning, risks associated, difference, features, stock futures, benefits of future market, components of future price, index and index futures, margin, hedging, hedging risks and portfolio returns using index futures, hedge ratio, cross hedge, perfect and imperfect hedge, stock lending scheme, forward rate interest, computation of appropriate interest rate
- (b) Options – meaning, types, call and put options, terms and timing of exercise in options

contract, determination of premium, intrinsic value and time value, strategy – spread, bull spread, bear spread, butterfly spread, box spread, combination, straddle, strangle, strips and straps, put-call parity, binomial tree approach, risk neutral valuation, Black-Scholes and Merton, evaluation of option pricing – delta, gamma, vega/lambda, theta, rho.

- (c) Swaps and Swaption – meaning, types, features, benefits, role of financial intermediaries, interest rate swaps, valuation of different swaps
- (d) Interest rate derivatives – meaning, interest rate caps, interest rate collars, forward rate agreements, interest rate futures

8. Financial Risk Management in International Operations

- (a) Forex market, equilibrium exchange rate, exchange rate arrangements, bid-ask rate and bid-ask rate spread, cross rate, currency arbitrage: two-point and three-point, parity conditions in International Finance: Purchasing Power Parity – Unbiased Forward Rate Theorem – Interest Rate Parity – Fisher Effect – International Fisher Effect, arbitrage operations, covered interest arbitrage
- (b) Exchange rate risk management – forex hedging tools, exposure netting, currency forward, cross currency roll over, currency futures, options, money market hedge, asset-liability management
- (c) Foreign Investment Analysis: International Portfolio Investment – International Capital Budgeting.
- (d) Sources of Foreign currency, debt route, depository receipts, American Depository Receipts (ADRs) – sponsored, unsponsored, Global Depository Receipts (GDRs), Warrants, Foreign Currency Convertible Bonds (FCCBs), Euro Issues, Euro Commercial Paper, Euro Convertible Bonds, Note Issuance Facility, Participating Notes
- (e) Foreign Investment in India, Joint Ventures, Foreign Technology
- (f) Taxation Issues in cross-border financing and investments,
- (g) International Transfer Pricing – Objectives – Arm's length pricing – techniques, advance pricing agreements, Maximization of MNC's income through Transfer Pricing strategy

SECTION C: SECURITY ANALYSIS & PORTFOLIO MANAGEMENT

[20 MARKS]

9. Security Analysis & Portfolio Management

- (a) Security analysis, Fundamental analysis, Economic analysis, Industry analysis, Company analysis, Technical analysis, Momentum analysis – arguments and criticisms
- (b) Market indicators, Support and resistance level, Patterns in stock price
- (c) Statistic models, Bollinger bands
- (d) Portfolio Management – meaning, objectives and basic principles, discretionary and non-discretionary portfolio managers
- (e) Theories on stock market movements – Dow Jones Theory, Markowitz Model
- (f) Risk analysis – types, systematic and unsystematic risk, standard deviation and variance, security beta, market model, alpha
- (g) Portfolio analysis – CAPM and assumption, Security and Capital market line, decision-making based on valuation, risk return ratio, arbitrage pricing model, portfolio return, portfolio risk co-efficient of variance, co-variance, correlation coefficient, correlation and diversification, minimum risk portfolio, hedging risks using risk free investments, project beta, levered and unlevered firms and proxy beta

SECTION D: INVESTMENT DECISIONS

[25 MARKS]

10. (a) Investment decisions under uncertainty

- (i) Estimation of project cash flow
- (ii) Relevant cost analysis

- (iii) Project reports – features and contents
- (iv) Project appraisal steps – general, inflationary and deflationary conditions
- (v) Techniques of project evaluation
- (vi) Investment decisions under uncertainties
- (vii) Difference in project life – EAC and LCM approaches, Capital Rationing, NPV vs. PI, NPV vs. IRR
- (viii) Social Cost Benefit Analysis, Break-even Analysis
- (ix) Inflation and Financial Management
- (x) Sensitivity Analysis, Certainty Equivalent Approach, Decision Tree Analysis, Standard Deviation in Capital Budgeting
- (xi) Hiller's Model, Hertz's Model
- (xii) Discount Rate Component, Risk Adjusted Discount Rate
- (xiii) Option in Capital Budgeting

(b) Investment in advanced technological environment

- (i) Financial forecasting
- (ii) Strategic management and Strategy levels
- (iii) Interface of financial strategy with corporate strategic management
- (iv) Completed financial plan, Corporate taxation and financing, Promoter's contribution
- (v) Cost of capital – cost of different sources of capital, weighted average cost of capital, marginal cost of capital, capital asset pricing model
- (vi) Debt financing – margin money, refinancing, bridge finance, syndication of loan and consortium, seed capital assistance, venture capital financing, deferred payment guarantee
- (vii) Lease financing – finance and operating lease, lease rentals, sale and lease back, cross-border leasing
- (viii) Debt securitization - features, advantages, factoring, forfeiting, bill discounting

(c) International Investments

- (i) World financial markets
- (ii) Foreign portfolio investments
- (iii) Modern portfolio theory
- (iv) Issues posed by portfolio investment
- (v) Foreign portfolio trends in India – emerging trends and policy developments

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Section A

Financial Markets and Institutions



Study Note - 1

AGENTS IN FINANCIAL MARKETS



This Study Note includes

- 1.1 Financial System
- 1.2 Reserve Bank of India (RBI)
- 1.3 Banking Institutions
- 1.4 Securities and Exchange Board of India (SEBI)
- 1.5 Non-Banking Financial Company (NBFC)
- 1.6 Insurance
- 1.7 Pension Plans
- 1.8 Mutual Funds

1.1 FINANCIAL SYSTEM

The financial system plays the key role in the economy by stimulating economic growth, influencing economic performance of the actors, affecting economic welfare. This is achieved by financial infrastructure, in which entities with funds allocate those funds to those who have potentially more productive ways to invest those funds. A financial system makes it possible a more efficient transfer of funds. As one party of the transaction may possess superior information than the other party, it can lead to the information asymmetry problem and inefficient allocation of financial resources. By overcoming asymmetry problem the financial system facilitates balance between those with funds to invest and those needing funds.

According to the **structural approach**, the financial system of an economy consists of three main components:

- 1) Financial markets;
- 2) Financial intermediaries (institutions); *[it may also be considered separately]*
- 3) Financial regulators.

Each of the components plays a specific role in the economy.

According to the **functional approach**, **financial markets** facilitate the flow of funds in order to finance investments by corporations, governments and individuals. **Financial institutions** are the key players in the financial markets as they perform the function of intermediation and thus determine the flow of funds. The **financial regulators** perform the role of monitoring and regulating the participants in the financial system.

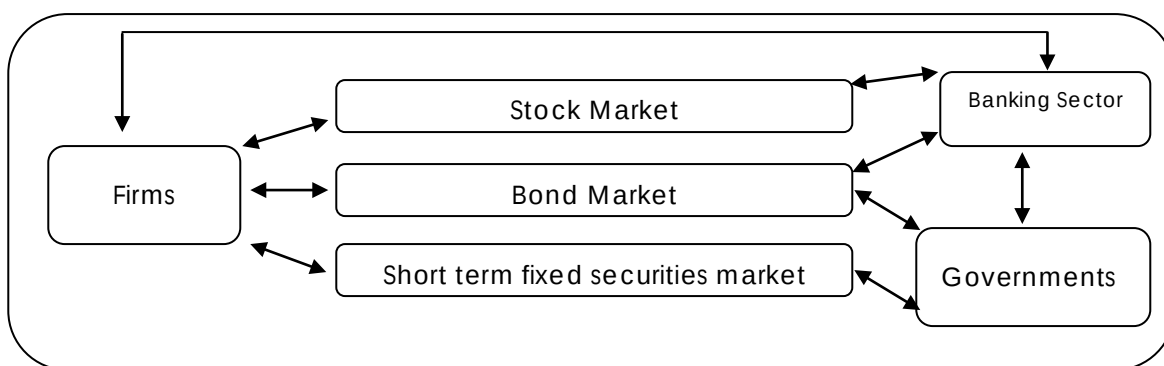


Figure: The Structure of financial system

Financial markets studies, based on capital market theory, focus on the financial system, the structure of interest rates, and the pricing of financial assets.

An **asset** is any resource that is expected to provide future benefits, and thus possesses economic value. Assets are divided into two categories: tangible assets with physical properties and intangible assets. An intangible asset represents a legal claim to some future economic benefits. The value of an intangible asset bears no relation to the form, physical or otherwise, in which the claims are recorded.

Financial assets, often called **financial instruments**, are intangible assets, which are expected to provide future benefits in the form of a claim to future cash. Some financial instruments are called *securities* and generally include stocks and bonds.

Any transaction related to financial instrument includes at least two parties:

- 1) the party that has agreed to make future cash payments and is called the *issuer*;
- 2) the party that owns the financial instrument, and therefore the right to receive the payments made by the issuer, is called the *investor*.

Financial assets provide the following key economic **functions**.

- ❖ they allow the transfer of funds from those entities, who have surplus funds to invest to those who need funds to invest in tangible assets;
- ❖ they redistribute the unavoidable risk related to cash generation among deficit and surplus economic units.

The claims held by the final wealth holders generally differ from the liabilities issued by those entities who demand those funds. Their role is performed by the specific entities operating in financial systems, called **financial intermediaries**. The latter ones transform the final liabilities into different financial assets preferred by the public.

1.1.1 Financial markets and their economic functions

A financial market is a market where financial instruments are exchanged or traded. Financial markets provide the following three major **economic functions**:

- 1) Price discovery
 - 2) Liquidity
 - 3) Reduction of transaction costs
- 1) **Price discovery** function means that transactions between buyers and sellers of financial instruments in a financial market determine the price of the traded asset. At the same time the required return from the investment of funds is determined by the participants in a financial market. The motivation



for those seeking funds (deficit units) depends on the required return that investors demand. It is these functions of financial markets that signal how the funds available from those who want to lend or invest funds will be allocated among those needing funds and raise those funds by issuing financial instruments.

- 2) **Liquidity** function provides an opportunity for investors to sell a financial instrument, since it is referred to as a measure of the ability to sell an asset at its fair market value at any time. Without liquidity, an investor would be forced to hold a financial instrument until conditions arise to sell it or the issuer is contractually obligated to pay it off. Debt instrument is liquidated when it matures, and equity instrument is until the company is either voluntarily or involuntarily liquidated. All financial markets provide some form of liquidity. However, different financial markets are characterized by the degree of liquidity.
- 3) The function of **reduction of transaction costs** is performed, when financial market participants are charged and/or bear the costs of trading a financial instrument. In market economies the economic rationale for the existence of institutions and instruments is related to transaction costs, thus the surviving institutions and instruments are those that have the lowest transaction costs.

The key attributes determining transaction costs are

- ❖ **Asset specificity,**
- ❖ **Uncertainty,**
- ❖ **Frequency of occurrence.**

Asset specificity is related to the way transaction is organized and executed. It is lower when an asset can be easily put to alternative use, can be deployed for different tasks without significant costs.

Transactions are also related to **uncertainty**, which has (1) external sources (when events change beyond control of the contracting parties), and (2) depends on opportunistic behavior of the contracting parties. If changes in external events are readily verifiable, then it is possible to make adaptations to original contracts, taking into account problems caused by external uncertainty. In this case there is a possibility to control transaction costs. However, when circumstances are not easily observable, opportunism creates incentives for contracting parties to review the initial contract and creates moral hazard problems. The higher the uncertainty, the more opportunistic behavior may be observed, and the higher transaction costs may be born.

Frequency of occurrence plays an important role in determining if a transaction should take place within the market or within the firm. A one-time transaction may reduce costs when it is executed in the market. Conversely, frequent transactions require detailed contracting and should take place within a firm in order to reduce the costs.

When assets are specific, transactions are frequent, and there are significant uncertainties intra-firm transactions may be the least costly. And, vice versa, if assets are non-specific, transactions are infrequent, and there are no significant uncertainties least costly may be market transactions.

The mentioned attributes of transactions and the underlying incentive problems are related to behavioural assumptions about the transacting parties. The economists (Coase (1932, 1960, 1988), Williamson (1975, 1985), Akerlof (1971) and others) have contributed to transactions costs economics by analyzing behaviour of the human beings, assumed generally self-serving and rational in their conduct, and also behaving opportunistically. Opportunistic behaviour was understood as involving actions with incomplete and distorted information that may intentionally mislead the other party. This type of behavior requires efforts of ex ante screening of transaction parties, and ex post safeguards as well as mutual restraint among the parties, which leads to specific transaction costs.

Transaction costs are classified into:

- 1) costs of search and information,
- 2) costs of contracting and monitoring,
- 3) costs of incentive problems between buyers and sellers of financial assets.

i) Costs of search and information are defined in the following way:

- ❖ Search costs fall into categories of explicit costs and implicit costs.

Explicit costs include expenses that may be needed to advertise one's intention to sell or purchase a financial instrument. Implicit costs include the value of time spent in locating counterparty to the transaction. The presence of an organized financial market reduces search costs.

- ❖ Information costs are associated with assessing a financial instrument's investment attributes. In a price efficient market, prices reflect the aggregate information collected by all market participants.

ii) Costs of contracting and monitoring are related to the costs necessary to resolve information asymmetry problems, when the two parties entering into the transaction possess limited information on each other and seek to ensure that the transaction obligations are fulfilled.

iii) Costs of incentive problems between buyers and sellers arise, when there are conflicts of interest between the two parties, having different incentives for the transactions involving financial assets.

The functions of a market are performed by its diverse participants. The participants in financial markets can be also classified into various groups, according to their motive for trading:

- ❖ Public investors, who ultimately own the securities and who are motivated by the returns from holding the securities. Public investors include private individuals and institutional investors, such as pension funds and mutual funds.
- ❖ Brokers, who act as agents for public investors and who are motivated by the remuneration received (typically in the form of commission fees) for the services they provide. Brokers thus trade for others and not on their own account.
- ❖ Dealers, who do trade on their own account but whose primary motive is to profit from trading rather than from holding securities. Typically, dealers obtain their return from the differences between the prices at which they buy and sell the security over short intervals of time.
- ❖ Credit rating agencies (CRAs) that assess the credit risk of borrowers.

In reality three groups are not mutually exclusive. Some public investors may occasionally act on behalf of others; brokers may act as dealers and hold securities on their own, while dealers often hold securities in excess of the inventories needed to facilitate their trading activities. The role of these three groups differs according to the trading mechanism adopted by a financial market.

1.1.2 Purpose of Finance

The fact that we all in our daily lives, are actively engaged in the business of finance in one form or another, upholds the importance of financial services. However, just so that we build a shared understanding on this, it is important to understand financial services and what role they play in improving well-being as understood generally.

There are no definitive prescriptions for "making" nations grow at a certain rate or to "lift" large numbers of people out of poverty. These tasks, are best left to the decisions and choices that myriad firms and individuals make and the task of policy makers is really an environmental one, i.e., to identify and build the various pieces of "institutional infrastructure" that can allow these individuals, households and

firms to make the best possible choices both from their personal points of view and in the aggregate, from a national point of view. There is considerable debate on what constitutes a full complement of high quality “institutional infrastructure” that does this. For example, in a recent debate hosted on the World Bank’s blog on whether democracy hinders or helps. It was a classic arm wrestling match between supporters of China’s way of doing things and India’s. However, unlike perhaps on the question of democracy, there is broad agreement that finance and well-functioning financial markets are an essential part of the “institutional infrastructure” that enables growth to proceed smoothly and at a rapid pace.

1.1.3 Indian Financial System

The Indian Financial System before independence closely resembled the model given by RL Benne in his theory of financial organization in a traditional economy. According to him in a traditional economy the per capita output is low and constant. Some principal features of the Indian Financial system before independence were: closed-circle character of industrial entrepreneurship; a narrow industrial securities market, absence of issuing institutions and no intermediaries in the long-term financing of the industry. Outside savings could not be invested in industry. That is, the savings of the financial system could not be channeled to investment opportunities in industrial sector. Indian Financial System to supply finance and credit was greatly strengthened in the post-1950. Significant diversification and innovations in the structure of the financial institutions, have accompanied the growth of Indian Financial System.

In the past 50 years the Indian financial system has shown tremendous growth in terms of quantity, diversity, sophistication, innovations and complexity of operation. Indicators like money supply, deposits and credit of banks, primary and secondary issues, and so on, have increased rapidly. India has witnessed all types of financial innovations like diversification, disintermediation, securitization, liberalization, and globalization etc. As a result, today the financial institutions and a large number of new financial instruments lead a fairly diversified portfolio of financial claims.

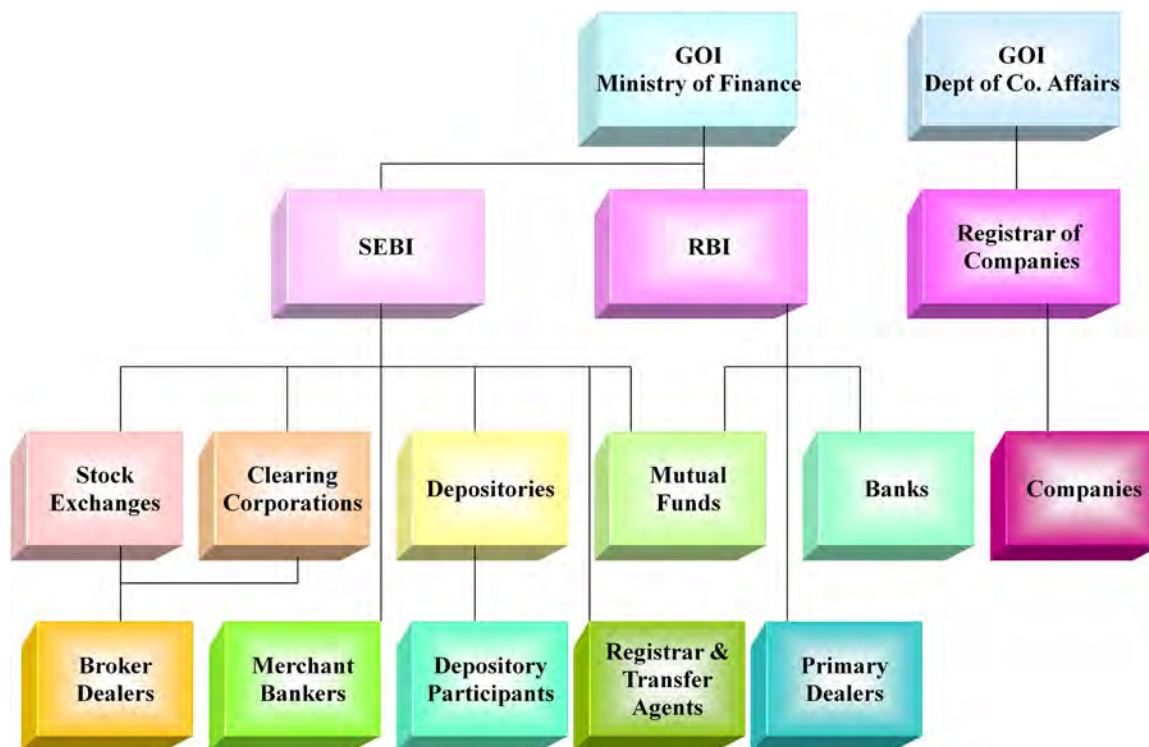
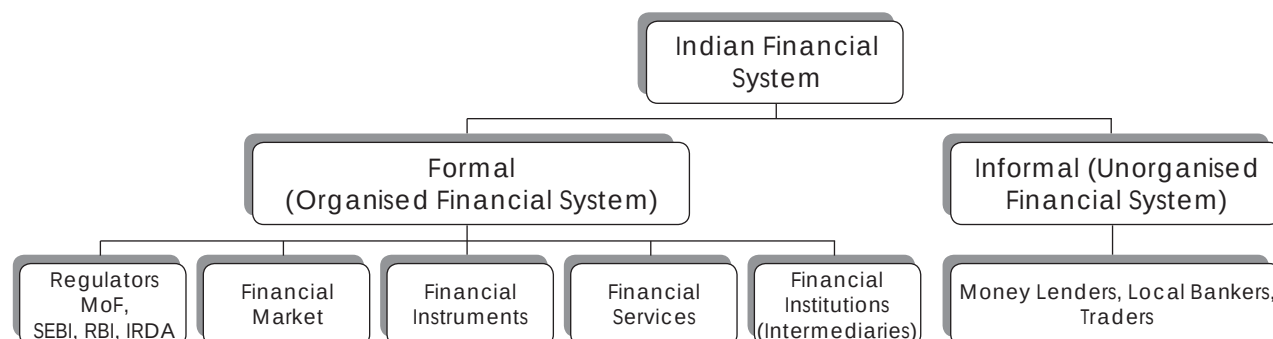


Figure: Regulatory Structure of Indian Financial System

The Indian financial system consists of formal and informal financial system. Based on the financial system financial market, financial instruments and financial intermediation can be categorized depending upon functionality.



1.1.4 Financial system – Process flow

Efficient and sound financial system of a country plays an important role in the nation's economic development. The economic development of a country depends upon the savings mobilization, credit creation and the flow of these funds to the investors by raising funds through the capital market, or borrowing from financial institutions. The savings of individuals, corporate sector and government should be mobilized by the financial institution, through financial markets by creating financial instruments and claims against themselves.

The flow chart of funds from savers to borrowers is given in the following figure. The funds of savers mobilized by various financial institutions will flow to the borrowers (users) in the following way which is depicted as follows:

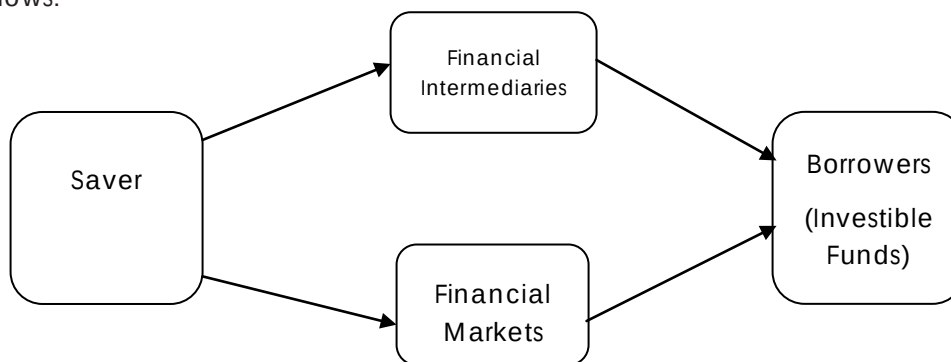


Fig: Flow of funds from savers to borrowers

The funds borrowed by the borrowers are invested in various productive activities which in turn increase the GDP, national income, supports other sectors of an economy to increase overall development of an economy besides generating employment.

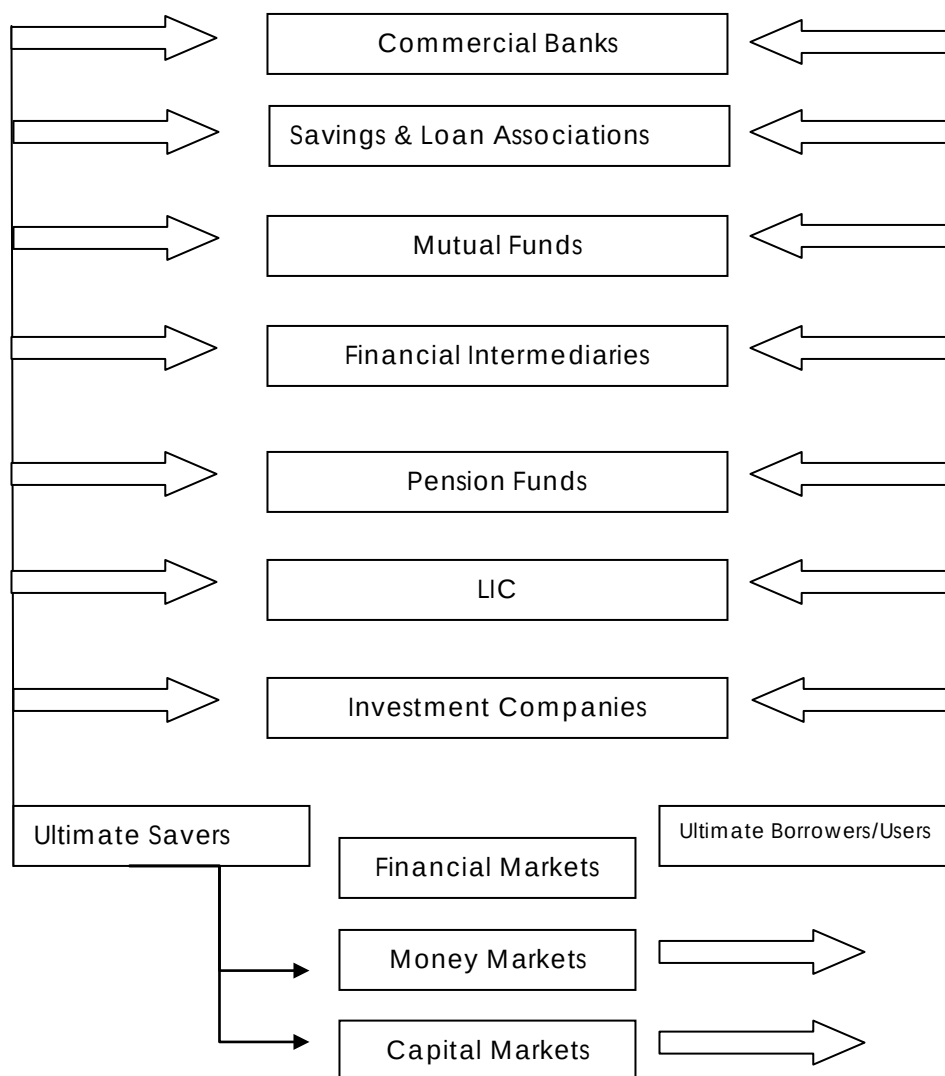


Figure: Flow of funds from savers to borrowers

Financial system comprises financial institutions, financial markets, financial instruments, financial services and financial assets. A well developed country will have well organized financial institutions which mobilize savings from sectors like household, business and government. They channelize these savings (funds) collected in the form of deposits and also credit created by these institutions to different sectors of an economy like industry, agriculture, services in the form of loans and advances. In the process of deposit mobilization and advancing loans the financial system introduces various instruments. The development of more number of instruments for deposit raising and advances is a symptom of development of an economy. It demands well developed financial markets of both primary and secondary or money market and capital markets for converting the financial instruments into liquidity. This increases the flow of funds from savings to investment, or from lending to investment or from instrument to instrument and so on. In the process of flow of funds from deposits to loans and advances through various instruments develops the capital and investment base of an economy and markets. In this process, various financial services will develop to accommodate the aspirations and requirements of entrepreneurs. These financial services are non-fund based organizations which help the fund based organizations and also entrepreneurs to convert their business ideas into a viable business units. The fund based institutions are those institutions which give investible funds to the entrepreneurs. The non-fund based institutions are those institutions which render services to the institutions and entrepreneurs

i.e. factoring, forfeiting, credit rating, etc. All those in turn contribute to the development of entire financial system, which improves the gross domestic product, national income, export and imports, research and development, balance of payments, and an all round development of an economy.

Financial System is a set of complex and closely connected or interlinked financial institutions, or organized and unorganized financial markets, financial instruments and services which facilitate the transfer and allocation of funds effectively and efficiently.

It means that the financial system has a number of complex and closely connected or interlinked institutions like banking institutions, public, private, new generation banks, foreign banks, co-operative banks, RRB's, besides many non-banking financial institutions like LIC, GIC, Mutual Funds, Investment Trusts, Finance Corporations, Finance Companies which are complex to classify and interrelated.

A financial system plays a vital role in the economic growth of a country. It intermediates between the flow of funds belonging to those who save a part of their income and those who invest in productive assets. It mobilises and usefully allocates scarce resources of a country.

Similarly, the financial markets are also for movement of funds from savers to intermediaries and from intermediaries to investors. In the meanwhile, they are also assisted by financial services like leasing, factoring, credit rating, etc. All these will help the transfer of funds in an economy from savers to investors.

1.1.5 Functions of a Financial System

The following are the functions of a Financial System:

- (i) Mobilise and allocate savings – linking the savers and investors to mobilise and allocate the savings efficiently and effectively.
- (ii) Monitor corporate performance – apart from selection of projects to be funded, through an efficient financial system, the operators are motivated to monitor the performance of the investment.
- (iii) Provide payment and settlement systems – for exchange of goods and services and transfer of economic resources through time and across geographic regions and industries. The clearing and settlement mechanism of the stock markets is done through depositories and clearing operations.
- (iv) Optimum allocation of risk-bearing and reduction - by framing rules to reduce risk by laying down the rules governing the operation of the system. This is also achieved through holding of diversified portfolios.
- (v) Disseminate price-related information – which acts as an important tool for taking economic and financial decisions and take an informed opinion about investment, disinvestment, reinvestment or holding of any particular asset.
- (vi) Offer portfolio adjustment facility – which includes services of providing quick, cheap and reliable way of buying and selling a wide variety of financial assets.
- (vii) Lower the cost of transactions – when operations are through and within the financial structure.
- (viii) Promote the process of financial deepening and broadening – through a well-functional financial system. Financial deepening refers to an increase of financial assets as a percentage of GDP. Financial depth is an important measure of financial system development as it measures the size of the financial intermediary sector. Financial broadening refers to building an increasing number of varieties of participants and instruments.

Key elements of a well-functioning Financial System

The basic elements of a well-functional financial system are:

- (i) a strong legal and regulatory environment;
- (ii) stable money;



- (iii) sound public finances and public debt management;
- (iv) a central bank;
- (v) a sound banking system;
- (vi) an information system; and
- (vii) well functioning securities market.

1.1.6 Designing a Financial System

A well-functioning financial system allows individuals, households, firms and entire nations to:

1. Think long-term and make investments both personal (e.g. advanced education) and financial (e.g. municipal finance) that have long horizons.
2. Assume risks that they are in the best position to beneficially manage (e.g. building hydro-electric power plants in the Himalayas) and shed the risks that they are unable to (e.g. credit exposure to vendors, wholesale price index).
3. Focus their attention on a few skill sets and activities (e.g. bio-medical engineering) and not be required to over-diversify physical skills to protect themselves against adverse shocks (e.g. shifts in the fortunes of the pharmaceutical industry).
4. To get resources at a “reasonable” price to build and grow high quality businesses (e.g. steel plants), should they have the skills and the desire to do so. If not, to have the ability to invest their resources in other businesses or in the larger economy at a level of risk that they are comfortable taking (e.g. participations in shipping insurance).
5. Ensure that day-to-day lives of individuals are smooth and risk free so that children can go to school, mothers can live lives without stress and the entire family can sit together and plan for a better future without being beset by unexpected shocks (e.g. cost of a home or a medical education).
6. Receive good guidance on how they might best live their financial lives from well-trained specialists who have the patience to understand their particular circumstances and their plans, dreams, and fears and have the competence to provide them with a sound set of financial tools that modern financial systems have the ability to provide and to be protected from deliberate or accidental mis-selling by their financial product providers and advisors (e.g. inappropriate sale of interest rate derivate products to companies).
7. Grow as far as their capacities and human and technological resources would allow them to without being bound by the limitations and size of financial systems (e.g. power plants, mining companies).

1.1.7 The Indian Financial System

The Indian financial system can also be broadly classified into the formal (organised) financial system and the informal (unorganised) financial system. The formal financial system comes under the purview of the Ministry of Finance (MoF), the Reserve Bank of India (RBI), the Securities and Exchange Board of India (SEBI), and other regulatory bodies.

The informal financial system consists of:

- ❖ Individual money lenders such as neighbours, relatives, landlords, traders and storeowners
- ❖ Groups of persons operating as ‘funds’ or associations. These groups function under a system of their own rules and use names such as ‘fixed fund’, ‘association’, and ‘saving club’.
- ❖ Partnership firms consisting of local brokers, pawnbrokers, and non-bank financial intermediaries such as finance, investment and chit-fund companies.

1.1.8 Structure of Indian Financial System

The financial structure refers to the shape, constituents and their order in the financial system. The financial system consists of specialized and unspecialized financial institutions, organized and unorganized financial markets, financial instruments and services which facilitate transfer of funds.

A financial system consists of financial institutions, financial markets, financial instruments and financial services which are all regulatory by regulators like Ministry of Finance, the Company Law Board, RBI, SEBI, IRDA, Department of Economic Affairs, Department of Company Affairs, etc., which facilitate the process of smooth and efficient transfer of funds.

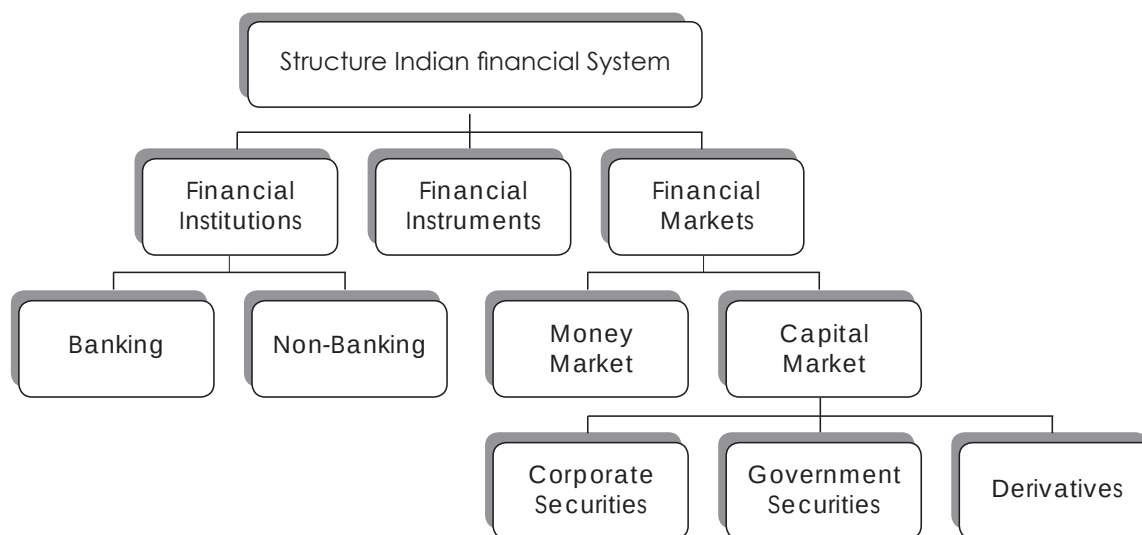


Figure: Structure of Indian Financial System

Each of the elements of financial system is detailed hereunder. The financial institutions may be business organizations or non-business organizations.

(A) Financial Institutions

Financial Institutions are the business organizations that act as mobilisers of savings, and as purveyors of credit or finance. They also provide various financial services to the community. These financial business organizations deal in financial assets such as deposits, loans, securities and so on. These assets can be seen on the asset side of the balance sheet of banks or any other financial institutions.

The non-financial institutions are those business organizations, which deal in real assets such as machinery, equipment, stock of goods, real assets, etc. These assets can be seen on the asset side of the balance sheet of the manufacturing companies.

The financial institutions are classified into banking institutions and non-banking institutions.

(i) Banking Financial Institutions

Banking institutions are those institutions, which participate in the economy's payment system, i.e. they provide transaction services. Their deposits liabilities constitute a major part of the national money supply and they can, as a whole, create deposits or credit, which is money.

(ii) Non-Banking Financial Institutions

Non-banking financial institutions are those institutions which act as mere purveyors of credit and they will not create credit, e.g., LIC, UTI, IDBI.



Basis	Banking Institutions	Non-Banking Institutions
Participation in payment mechanism	The Banks participate in the economy's payments mechanism.	Non-banking institutions do not participate in the payments mechanism of an economy.
Transaction Services	Banks provide transaction services like providing overdraft facility, issue of cheque books, traveller's cheque, demand draft, transfer of funds, etc	The non-banking institutions do not provide any transaction services
Deposits as a part of National Money supply	Bank deposits (are the liabilities to the banks) constitute a major part of the national money supply.	The money supply of the non-banking institutions is small
Credit creation	banks create credit	Non-banking institutions do not create credit
Compliance	Banks are subjected to fulfilment of some legal requirements like Cash Reserve Ratio (CRR), Capital Adequacy Ratio (CAR)	Non-banking institutions are subjected to these legal requirements.
Advance credit	banks can advance credit by creating claims against themselves	Non-banking institutions cannot do so.

According to Sayers, banking institutions are 'creators' of credit and NBFIs are mere "purveyors" of credit.

The financial institutions are also classified into financial intermediaries and non-financial intermediaries.

(a) Financial Intermediaries

Financial intermediaries are those institutions which are intermediate between savers and investors; they lend money as well as mobilize savings, their liabilities are towards the ultimate savers, while their assets are from the investors or borrowers.

(b) Non-financial Intermediaries

Non-financial intermediaries are those institutions which do the loan business but their resources are not directly obtained from the savers. Many non-banking institutions also act as intermediaries and when they do so they are known as non-banking financial intermediaries, e.g. LIC, GIC, IDBI, IFC, NABARD.

Another part of the financial system is Financial Markets.

(c) Financial Markets

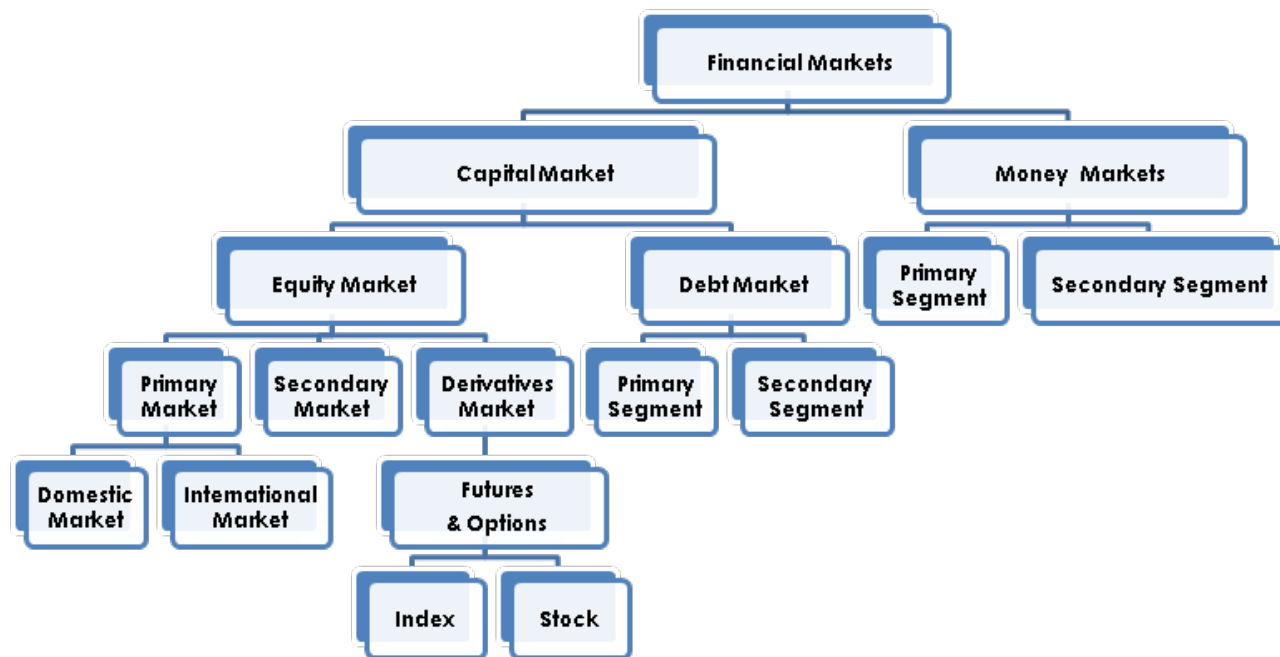
Efficient financial markets are a sine qua non for speedy economic development. The vibrant financial market enhances the efficiency of capital formation. This market facilitates the flow of savings into investment against capital formation. The role of financial markets in the financial system is quite unique. The financial markets bridge one set of financial intermediaries with another set of players.

Financial markets are the centres or arrangements that provide facilities for buying and selling of financial claims and services. The participants in the financial markets are corporations, financial institutions, individual and the government. These participants trade in financial products in these markets. They trade either directly or through brokers or through brokers and dealers in organized exchanges or off-exchanges. They are classified into money market and capital market, primary market and secondary markets, organized markets and unorganized markets.

Classification of Financial Markets

There are different ways of classifying financial markets. One way of classifying the financial markets is by the type of financial claim into the debt market and the equity market. The debt market is the financial market for fixed claims like debt instruments. The equity market is the financial market for residual claims i.e. equity instruments.

A second way of classifying the financial markets into money market and capital market is on the basis of maturity of claims.



(c) Financial Instruments

Financial instruments are those instruments which are used for raising resources for corporate entities. The financial instruments may be capital market instruments or money market instruments. The financial instruments that are used for raising capital through the capital market as known as 'capital market instruments'. They are preference shares, equity shares, warrants, debentures and bonds. The financial instruments which are used for raising and supplying money in a short period not exceeding one year through various securities are called 'money market instruments'.

For example, Treasury bill, gilt-edged securities, state government and public sector instruments, commercial paper, commercial bills, etc.

1.1.9 Financial Services

Financial services are an important component of financial system. Financial services cater to the needs of the financial institutions, financial markets and financial instruments. Financial institutions serve individuals and institutional investors. The financial institutions and financial markets help the financial system through financial instruments. They require a number of services of financial nature in order to full the tasks assigned. The functioning of financial system very much depends on the range of financial services provided by the providers, and their efficiency.

Functions of Financial Service Institutions:

1. These firms not only help to raise the required funds but also assure the efficient deployment of funds.
2. They assist in deciding the financial risks.



3. They extend their services upto the stage of servicing of lenders.
4. They provide services like bill discounting, factoring of debtors, parking of short-term funds in the money market, e-commerce, securitization of debts, and so on to ensure an efficient management of funds.
5. These firms provide some specialized services like credit rating, mutual funds, venture capital financing, lease financing, factoring, mutual funds, merchant banking, stock lending, depository, credit cards, housing finance and merchant banking and so on. These services are generally provided by banking companies, insurance companies, stock exchanges and non-banking finance companies.

1.2 RESERVE BANK OF INDIA (RBI)

The Reserve Bank of India (RBI) is the nation's central bank. Since 1935, RBI began operations, and stood at the centre of India's financial system, with a fundamental commitment to maintaining the nation's monetary and financial stability.

From ensuring stability of interest and exchange rates to providing liquidity and an adequate supply of currency and credit for the real sector; from ensuring bank penetration and safety of depositors' funds to promoting and developing financial institutions and markets, and maintaining the stability of the financial system through continued macro-financial surveillance, the Reserve Bank plays a crucial role in the economy. Decisions adopted by RBI touch the daily life of all Indians and help chart the country's current and future economic and financial course.

The origin of the Reserve Bank can be traced to 1926, when the Royal Commission on Indian Currency and Finance—also known as the Hilton-Young Commission—recommended the creation of a central bank to separate the control of currency and credit from the government and to augment banking facilities throughout the country. The Reserve Bank of India Act of 1934 established the Reserve Bank as the banker to the central government and set in motion a series of actions culminating in the start of operations in 1935. Since then, the Reserve Bank's role and functions have undergone numerous changes—as the nature of the Indian economy has changed.

Today's RBI bears some resemblance to the original institution, although our mission has expanded along with our deepened, broadened and increasingly globalised economy.

Over the years, RBI's specific roles and functions have evolved. However, there have been certain constants, such as the integrity and professionalism with which the Reserve Bank discharges its mandate.

RBI at a Glance

- ❖ Managed by Central Board of Directors
- ❖ India's monetary authority
- ❖ Supervisor of financial system
- ❖ Issuer of currency
- ❖ Manager of foreign exchange reserves
- ❖ Banker and debt manager to government
- ❖ Supervisor of payment system
- ❖ Banker to banks
- ❖ Maintaining financial stability
- ❖ Developmental functions
- ❖ Research, data and knowledge sharing

The journey of RBI

1935	Operations begin on April 1
1949	Nationalisation of Reserve Bank; Banking Regulation Act enacted
1950	India embarks on planned economic development. The Reserve Bank becomes active agent and participant
1966	Co-operative banks come under RBI regulation
1969	Nationalisation of 14 major commercial banks (six more were nationalized in 1980)
1973	RBI strengthens exchange controls by amending Foreign Exchange Regulation Act (FERA)
1974	Introduction of priority sector lending targets
1975	Regional Rural Banks set up
1985	Financial market reforms begin with Sukhamoy Chakravarty and Vaghul Committee Reports
1991	India faces balance of payment crisis, pledges gold to shore up reserves. Rupee devalued
1993	Exchange rate becomes market determined
1994	Board for Financial supervision set up
1997	Ad hoc treasury bills phased out ending automatic monetization
1997	Regulation of Non-Banking Finance Companies strengthened
1998	Multiple indicator approach for monetary policy adopted
2000	Foreign Exchange Management Act (FEMA) replaces FERA
2002	Clearing Corporation of India Limited (CCIL) commences clearing and settlement in government securities
2003	Fiscal Responsibility and Budget Management Act enacted
2004	Transition to a full-fledged daily liquidity adjustment facility (LAF) completed. Market Stabilisation Scheme (MSS) introduced sterilize capital flows
2005	Focus on financial inclusion and increasing outreach of the banking sector
2006	RBI empowered to regulate money , forex, G-sec and gold related securities market
2007	RBI empowered to regulate Payment System
2008/9	Pro-active efforts to minimize impact of global financial crisis

1.2.1 Structure, Organization and Governance

The Reserve Bank is wholly owned by the Government of India. The Central Board of Directors oversees the Reserve Bank's business.

The Central Board has primary authority for the oversight of the Reserve Bank. It delegates specific functions through its committees and sub-committees

Central Board includes the Governor, Deputy Governors and a few Directors (of relevant local boards). The Central Board of Directors includes:

- ❖ Official Directors
 - ✓ 1 Governor
 - ✓ 4 Deputy Governors at a maximum



- ❖ Non-official Directors
 - ✓ 4 Directors – nominated by the Central Government to represent each local board
 - ✓ 10 Directors nominated by the Central Government with expertise in various segments of the economy
 - ✓ 1 representative of the Central Government
- ❖ Holding of Meetings of the Board
 - ✓ 6 meetings – at a minimum – each year
 - ✓ 1 meeting – at a minimum – each quarter

Committee of Central Board: Oversees the current business of the central bank and typically meets every week, on Wednesdays. The agenda focuses on current operations, including approval of the weekly statement of accounts related to the issue of Banking Departments.

Board of Financial Supervision:

Regulates and supervises commercial banks, Non-Banking Finance Companies (NBFCs), development finance institutions, urban co-operative banks and primary dealers.

Board of Payment and Settlement Systems:

Regulates and supervises the payment and settlement systems.

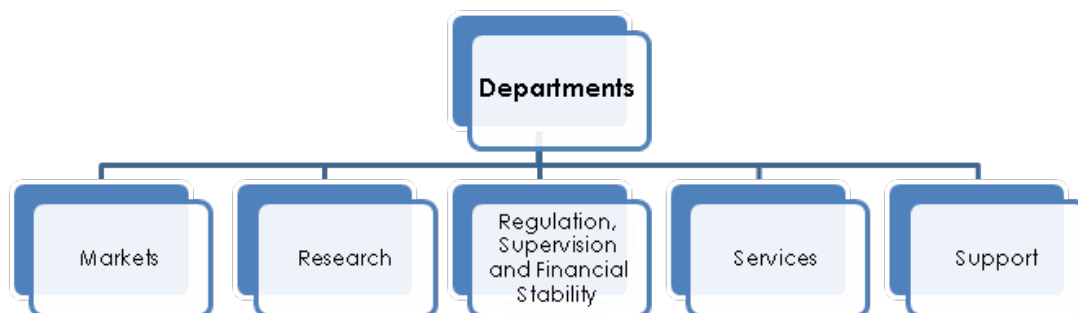
Sub-Committees of the Central Board:

Includes those on Inspection and Audit; Staff; and Building. Focus of each sub-committee is on specific areas of operations.

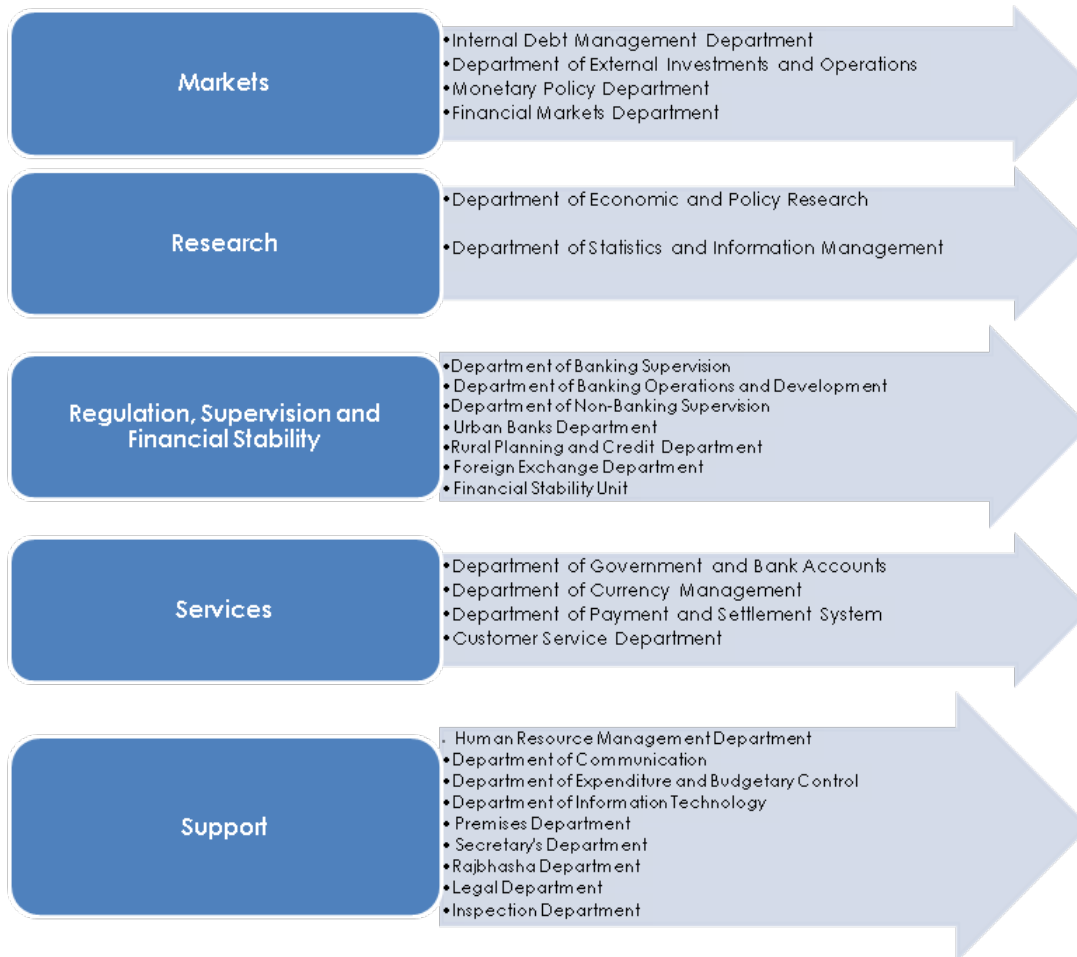
Local Boards: In Chennai, Kolkata, Mumbai and New Delhi, representing the country's four regions. Local Board members, appointed by the Central Government for four year terms, represent regional and economic interests and the interests of co-operative and indigenous banks.

1.2.2 Management and Structure

The Governor is the Reserve Bank's Chief Executive. The Governor supervises and directs the affairs and business of the Reserve Bank. The management team also includes Deputy Governors and Executive Directors.



The Departments has the following sub-departments:



1.2.3 Main Activities of RBI

The Reserve Bank is the umbrella network for numerous activities, all related to the nation's financial sector, encompassing and extending beyond the functions of a typical central bank. This section provides an overview of our primary activities:

- ❖ Monetary Authority
- ❖ Issuer of Currency
- ❖ Banker and Debt Manager to Government
- ❖ Banker to Banks
- ❖ Regulator of the Banking System
- ❖ Manager of Foreign Exchange
- ❖ Maintaining Financial Stability
- ❖ Regulator and Supervisor of the Payment and Settlement Systems
- ❖ Developmental Role



(i) Monetary Authority

Monetary policy refers to the use of instruments under the control of the central bank to regulate the availability, cost and use of money and credit. The goal: achieving specific economic objectives, such as low and stable inflation and promoting growth.

"The basic functions of the Reserve Bank of India are to regulate the issue of Bank notes and the keeping of reserves with a view to securing monetary stability in India and generally to operate the currency and credit system of the country to its advantage" – From the Preamble of the Reserve Bank of India Act, 1934.

The main objectives of monetary policy in India are:

- ❖ Maintaining price stability
- ❖ Ensuring adequate flow of credit to the productive sectors of the economy to support economic growth
- ❖ Financial stability

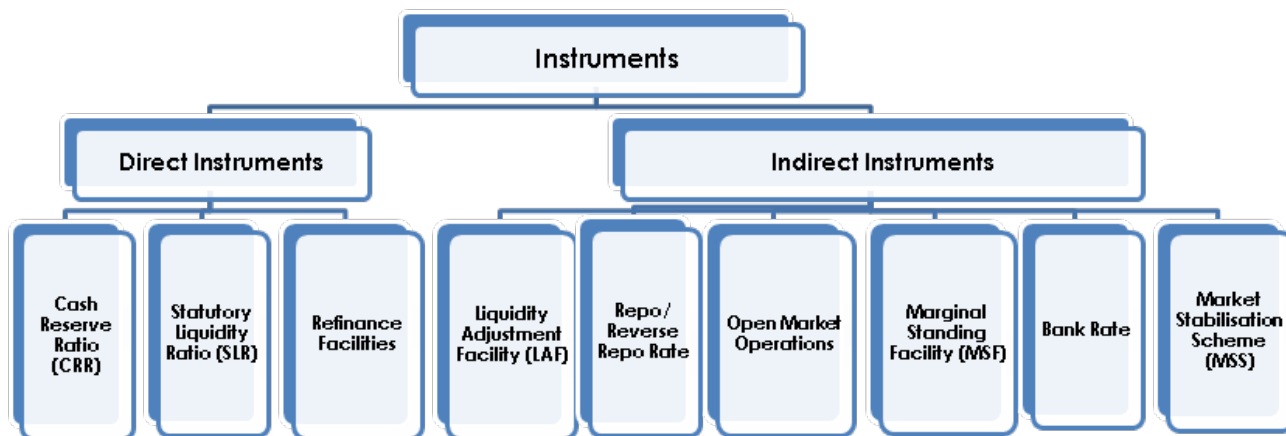
The relative emphasis among the objectives varies from time to time, depending on evolving macroeconomic developments.

Approach

The operating framework is based on a multiple indicator approach. This means that there is a close monitoring and analysis of the movement of a number of indicators including interest rates, inflation rate, money supply, credit, exchange rate, trade, capital flows and fiscal position, along with trends in output as we develop our policy perspectives.

Tools

The Reserve Bank's Monetary Policy Department (MPD) formulates monetary policy. The Financial Markets Department (FMD) handles day-to-day liquidity management operations. There are several direct and indirect instruments that are used in the formulation and implementation of monetary policy.



The instruments are discussed in details hereunder:

Direct Instruments

Cash Reserve Ratio (CRR): The share of net demand and time liabilities that banks must maintain as cash balance with the Reserve Bank. The Reserve Bank requires banks to maintain a certain amount of cash in reserve as percentage of their deposits to ensure that banks have sufficient cash to cover customer withdrawals. The adjustment of this ratio, is done as an instrument of monetary policy, depending on prevailing conditions. Our centralized and computerized system allows for efficient and accurate monitoring of the balances maintained by banks with the Reserve Bank of India.

Statutory Liquidity Ratio (SLR): The share of net demand and time liabilities that banks must maintain in safe and liquid assets, such as government securities, cash and gold.

Refinance facilities: Sector-specific refinance facilities (e.g., against lending to export sector) provided to banks exchange or other commercial papers. It also signals the medium-term stance of monetary policy.

Indirect Instruments

Liquidity Adjustment Facility (LAF): Consists of daily infusion or absorption of liquidity on a repurchase basis, through repo (liquidity injection) and reverse repo (liquidity absorption) auction operations, using government securities as collateral.

Repo/Reverse Repo Rate: These rates under the Liquidity Adjustment Facility (LAF) determine the corridor for short-term money market interest rates. In turn, this is expected to trigger movement in other segments of the financial market and the real economy.

Open Market Operations (OMO): Outright sales/purchases of government securities, in addition to LAF, as a tool to determine the level of liquidity over the medium term.

Marginal Standing Facility (MSF): was instituted under which scheduled commercial banks can borrow over night at their discretion up to one per cent of their respective NDTL at 100 basis points above the repo rate to provide a safety valve against unanticipated liquidity shocks

Bank Rate: It is the rate at which the Reserve Bank is ready to buy or rediscount bills of exchange or other commercial papers. It also signals the medium-term stance of monetary policy.

Market Stabilisation Scheme (MSS): This instrument for monetary management was introduced in 2004. Liquidity of a more enduring nature arising from large capital flows is absorbed through sale of short-dated government securities and treasury bills. The mobilized cash is held in a separate government account with the Reserve Bank.

(ii) Issuer of Currency

The Reserve Bank is the nation's sole note issuing authority. Along with the Government of India, we are responsible for the design and production and overall management of the nation's currency, with the goal of ensuring an adequate supply of clean and genuine notes. The Reserve Bank also makes sure there is an adequate supply of coins, produced by the government. In consultation with the government, we routinely address security issues and target ways to enhance security features to reduce the risk of counterfeiting or forgery.

Approach

- ❖ The Department of Currency Management in Mumbai, in co-operation with the Issue Departments in the Reserve Bank's regional offices, oversees the production and manages the distribution of currency.
- ❖ Currency chests at more than 4,000 bank branches – typically commercial banks – contain adequate quantity of notes and coins so that the currency is accessible to the public in all parts of the country.
- ❖ The Reserve Bank has the authority to issue notes upto the value of Rupees Ten Thousand.

RBI's Anti-counterfeiting Measures

- ❖ Continual upgrades of bank note security features
- ❖ Public awareness campaigns to educate citizens to help prevent circulation of forged or counterfeit notes
- ❖ Installation of note sorting machines



(iii) Banker and Debt Manager to Government

Managing the government's banking transactions is a key RBI role. Like individuals, businesses and banks, governments need a banker to carry out their financial transactions in an efficient and effective manner, including the raising of resources from the public. As a banker to the central government, the Reserve Bank maintains its accounts, receives money into and makes payments out of these accounts and facilitates the transfer of government funds. RBI also act as the banker to those state governments that has entered into an agreement.

Approach

The role as banker and debt manager to government includes several distinct functions:

- ❖ Undertaking banking transactions for the central and state governments to facilitate receipts and payments and maintaining their accounts.
- ❖ Managing the governments' domestic debt with the objective of raising the required amount of public debt in a cost-effective and timely manner.
- ❖ Developing the market for government securities to enable the government to raise debt at a reasonable cost, provide benchmarks for raising resources by other entities and facilitate transmission of monetary policy actions.

Tools

At the end of each day, RBI's electronic system automatically consolidates all of the government's transactions to determine the net final position. If the balance in the government's account shows a negative position, RBI extends a short-term, interest-bearing advance, called a Ways and Means Advance-WMA-the limit or amount for which is set at the beginning of each financial year in April.

The RBI's Government Finance Operating Structure

The Reserve Bank's Department of Government and Bank Accounts oversees governments' banking related activities. This department encompasses:

- ❖ **Public accounts departments:** manage the day-to-day aspects of Government's banking operations. The Reserve Bank also appoints commercial banks as its agents and uses their branches for greater access to the government's customers.
- ❖ **Public debt offices:** provide depository services for government securities for banks, institutions and service government loans.
- ❖ **Central Accounts Section at Nagpur:** consolidates the government's banking transactions.

The Internal Debt Management Department based in Mumbai raises the government's domestic debt and regulates and develops the government securities market. RBI plays a critical role managing the issuance of public debt. Part of this role includes informing potential investors about upcoming debt auctions through notices.

RBI as the Governments' Debt Manager

In this role, we set policies, in consultation with the government and determine the operational aspects of raising money to help the government finance its requirements:

- ❖ Determine the size, tenure and nature (fixed or floating rate) of the loan
- ❖ Define the issuing process including holding of auctions
- ❖ Inform the public and potential investors about upcoming government loan auctions

The Reserve Bank also undertakes market development efforts, including enhanced secondary market trading and settlement mechanisms, authorisation of primary dealers and improved transparency of

issuing process to increase investor confidence, with the objective of broadening and deepening the government securities market.

(iv) Banker to Banks

Like individual consumers, businesses and organisations of all kinds, banks need their own mechanism to transfer funds and settle inter-bank transactions—such as borrowing from and lending to other banks—and customer transactions. As the banker to banks, the Reserve Bank fulfills this role. In effect, all banks operating in the country have accounts with the Reserve Bank, just as individuals and businesses have accounts with their banks.

Approach

As the banker to banks, RBI focus on:

- ❖ Enabling smooth, swift and seamless clearing and settlement of inter-bank obligations.
- ❖ Providing an efficient means of funds transfer for banks.
- ❖ Enabling banks to maintain their accounts with us for purpose of statutory reserve requirements and maintain transaction balances.
- ❖ Acting as lender of the last resort.

Tools

The Reserve Bank provides products and services for the nation's banks similar to what banks offer their own customers. Here's a look at how RBI help:

Non-interest earning current accounts: Banks hold accounts with the Reserve Bank based on certain terms and conditions, such as, maintenance of minimum balances. They can hold accounts at each of our regional offices. Banks draw on these accounts to settle their obligations arising from inter-bank settlement systems. Banks can electronically transfer payments to other banks from this account, using the Real Time Gross Settlement System (RTGS).

Deposit Accounts Department: This department's computerized central monitoring system helps banks manage their funds position in real time to maintain the optimum balance between surplus and deficit centers.

Remittance facilities: Banks and government departments can use these facilities to transfer funds.

Lender of the last resort: The Reserve Bank provides liquidity to banks unable to raise short-term liquid resources from the inter-bank market. Like other central banks, the Reserve Bank considers this a critical function because it protects the interests of depositors, which in turn, has a stabilizing impact on the financial system and on the economy as a whole.

Loans and advances: The Reserve Bank provides short-term loans and advances to banks/ financial institutions, when necessary, to facilitate lending for specified purposes.

(v) Regulator of the Banking System

Banks are fundamental to the nation's financial system. The central bank has a critical role to play in ensuring the safety and soundness of the banking system—and in maintaining financial stability and public confidence in this system. As the regulator and supervisor of the banking system, the Reserve Bank protects the interests of depositors, ensures a framework for orderly development and conduct of banking operations conducive to customer interests and maintains overall financial stability through preventive and corrective measures.

Approach

The Reserve Bank regulates and supervises the nation's financial system. Different departments of the Reserve Bank oversee the various entities that comprise India's financial infrastructure. RBI oversee:



- ❖ **Commercial banks and all-India development financial institutions:** Regulated by the Department of Banking Operations and Development, supervised by the Department of Banking Supervision
- ❖ **Urban co-operative banks:** Regulated and supervised by the Urban Banks Department
- ❖ **Regional Rural Banks (RRB), District Central Cooperative Banks and State Co-operative Banks:** Regulated by the Rural Planning and Credit Department and supervised by NABARD
- ❖ **Non-Banking Financial Companies (NBFC):** Regulated and supervised by the Department of Non-Banking Supervision

Tools

The Reserve Bank makes use of several supervisory tools:

- ❖ On-site inspections
- ❖ Off-site surveillance, making use of required reporting by the regulated entities.
- ❖ Thematic inspections, scrutiny and periodic meetings

The Board for Financial Supervision oversees the Reserve Bank's regulatory and supervisory responsibilities. Consumer confidence and trust are fundamental to the proper functioning of the banking system. RBI's supervision and regulation helps ensure that banks are stable and that the system functions smoothly.

The RBI's Regulatory Role

As the nation's financial regulator, the Reserve Bank handles a range of activities, including:

- ❖ Licensing
- ❖ Prescribing capital requirements
- ❖ Monitoring governance
- ❖ Setting prudential regulations to ensure solvency and liquidity of the banks
- ❖ Prescribing lending to certain priority sectors of the economy
- ❖ Regulating interest rates in specific areas
- ❖ Setting appropriate regulatory norms related to income recognition, asset classification, provisioning, investment valuation, exposure limits and the like
- ❖ Initiating new regulation

Looking Ahead

In the regulatory and supervisory arena, there are several challenges going forward.

- ❖ **For commercial banks:** Focus is on implementing Basel III norms, which will require improved capital planning and risk management skills.
- ❖ **For urban cooperative banks:** Focus is on profitability, professional management and technology enhancement.
- ❖ **For NBFCs:** Focus is on identifying the interconnections and the roles these institutions should play as the financial system deepens.
- ❖ **For regional rural banks:** Focus is on enhancing capability through IT and HR for serving the rural areas.
- ❖ **For rural cooperative banks:** Focus is on ensuring that they meet minimum prudential standards.

(vi) Manager of Foreign Exchange

With the transition to a market-based system for determining the external value of the Indian rupee,

the foreign exchange market in India gained importance in the early reform period. In recent years, with increasing integration of the Indian economy with the global economy arising from greater trade and capital flows, the foreign exchange market has evolved as a key segment of the Indian financial market.

Approach

The Reserve Bank plays a key role in the regulation and development of the foreign exchange market and assumes three broad roles relating to foreign exchange:

- ❖ Regulating transactions related to the external sector and facilitating the development of the foreign exchange market
- ❖ Ensuring smooth conduct and orderly conditions in the domestic foreign exchange market
- ❖ Managing the foreign currency assets and gold reserves of the country

Tools

The Reserve Bank is responsible for administration of the Foreign Exchange Management Act, 1999 and regulates the market by issuing licences to banks and other select institutions to act as Authorised Dealers in foreign exchange. The Foreign Exchange Department (FED) is responsible for the regulation and development of the market.

On a given day, the foreign exchange rate reflects the demand for and supply of foreign exchange arising from trade and capital transactions. The RBI's Financial Markets Department (FMD) participates in the foreign exchange market by undertaking sales / purchases of foreign currency to ease volatility in periods of excess demand for/supply of foreign currency.

The Department of External Investments and Operations (DEIO) invests the country's foreign exchange reserves built up by purchase of foreign currency from the market. In investing its foreign assets, the Reserve Bank is guided by three principles: safety, liquidity and return.

Looking Ahead

The challenge now is to liberalise and develop the foreign exchange market, with an eye toward ushering in greater market efficiency while ensuring financial stability in an increasingly global financial market environment. With current account convertibility achieved in 1994, the key focus is now on capital account management.

(vii) Regulator and Supervisor of Payment and Settlement Systems

Payment and settlement systems play an important role in improving overall economic efficiency. They consist of all the diverse arrangements that we use to systematically transfer money - currency, paper instruments such as cheques, and various electronic channels.

Approach

The Payment and Settlement Systems Act of 2007 (PSS Act) gives the Reserve Bank oversight authority, including regulation and supervision, for the payment and settlement systems in the country. In this role, we focus on the development and functioning of safe, secure and efficient payment and settlement mechanisms.

Tools

The Reserve Bank has a two-tiered structure. The first tier provides the basic framework for our payment systems. The second tier focusses on supervision of this framework. As part of the basic framework, the Reserve Bank's network of secure systems handles various types of payment and settlement activities. Most operate on the security platform of the Indian Financial Network (INFINET), using digital signatures for further security of transactions. The various systems used are as follows:



- ❖ **Retail payment systems:** Facilitating cheque clearing, electronic funds transfer, through National Electronic Funds Transfer (NEFT), settlement of card payments and bulk payments, such as electronic clearing services. Operated through local clearing houses throughout the country.
- ❖ **Large value systems:** Facilitating settlement of inter-bank transactions from financial markets. These include:
 - ✓ Real Time Gross Settlement System (RTGS): for funds transfers
 - ✓ Securities Settlement System: for the government securities market
 - ✓ Foreign Exchange Clearing: for transactions involving foreign currency
- ❖ **Department of Payment and Settlement Systems:** The Reserve Bank's payment and settlement systems regulatory arm.
- ❖ **Department of Information Technology:** Technology support for the payment systems and for the Reserve Bank's internal IT systems.

Looking Ahead

Going forward, we are proactively identifying and addressing issues that help mitigate the risks for large value systems. Efforts on the retail payment system side will focus on operational efficiencies, cost effectiveness, innovation and risk management.

(viii) Maintaining Financial Stability

Pursuit of financial stability has emerged as a key critical policy objective for the central banks in the wake of the recent global financial crisis. Central banks have a critical role to play in achieving this objective. Though financial stability is not an explicit objective of the Reserve Bank in terms of the Reserve Bank of India Act, 1935, it has been an explicit objective of the Reserve Bank since the early 2000s.

Approach

In 2009, the Reserve Bank set up a dedicated Financial Stability Unit mainly to, put in place a system of continuous monitoring of the macro financial system. The department's remit includes:

- ❖ Conduct of macro-prudential surveillance of the financial system on an ongoing basis
- ❖ Developing models for assessing financial stability in going forward
- ❖ Preparation of half yearly financial stability reports.
- ❖ Development of a database of key variables which could impact financial stability, in co-ordination with the supervisory wings of the Reserve Bank
- ❖ Development of a time series of a core set of financial indicators
- ❖ Conduct of systemic stress tests to assess resilience

Following the establishment of the Financial Stability Unit, the Reserve Bank started publishing periodic financial stability reports, with the first Financial Stability Report (FSR) being published in March 2010. FSRs are now being published on a half yearly basis - in June and December every year. Internally, quarterly Systemic Risk Monitors and monthly Market Monitors are prepared to place before the Bank's Top Management a more frequent assessment of the risks to systemic stability of the economy.

In the Union Budget for 2010-11, the Finance Minister announced the establishment of Financial Stability and Development Council (FSDC) to provide, among other things, a high level focus to financial stability. The Reserve Bank plays a critical role in the Council. The Governor, Reserve Bank, is the ex-officio chairperson of the Sub Committee of the FSDC – the Council's main operating arm. The Financial Stability Unit of the Reserve Bank of India acts as the Secretariat for the Sub Committee.

Tools

The Reserve Bank makes use of a variety of tools and techniques to assess the build-up of systemic risks in the economy and to provide critical inputs in this respect to its policy making departments. The tools include:

- ❖ A **Financial Stress Indicator** - a contemporaneous indicator of conditions in financial markets and in the banking sector;
- ❖ **Systemic Liquidity Indicator** for assessing stresses in availability of systemic liquidity;
- ❖ A **Fiscal Stress Indicator** for assessing build up of risks from the fiscal;
- ❖ A **Network Model** of the bilateral exposures in the financial system - for assessing the inter-connectedness in the system;
- ❖ A **Banking Stability Indicator** for assessing risk factors having a bearing on the stability of the banking sector; and
- ❖ A series of **Banking Stability Measures** for assessing the systemic importance of individual banks.

Looking Ahead

Launching a Systemic Risk Survey to more formally elicit market views on the possible sources of risk to systemic stability of the country - both, domestic and global.

(ix) Developmental Role

This role is, perhaps, the most unheralded aspect of our activities, yet it remains among the most critical. This includes ensuring credit availability to the productive sectors of the economy, establishing institutions designed to build the country's financial infrastructure, expanding access to affordable financial services and promoting financial education and literacy.

Approach

Over the years, the Reserve Bank has added new institutions as the economy has evolved. Some of the institutions established by the RBI include:

- ❖ Deposit Insurance and Credit Guarantee Corporation (1962), to provide protection to bank depositors and guarantee cover to credit facilities extended to certain categories of small borrowers
- ❖ Unit Trust of India (1964), the first mutual fund of the country
- ❖ Industrial Development Bank of India (1964), a development finance institution for industry
- ❖ National Bank for Agriculture and Rural Development (1982), for promoting rural and agricultural credit
- ❖ Discount and Finance House of India (1988), a money market intermediary and a primary dealer in government securities
- ❖ National Housing Bank (1989), an apex financial institution for promoting and regulating housing finance
- ❖ Securities and Trading Corporation of India (1994), a primary dealer

Tools

The Reserve Bank continues its developmental role, while specifically focusing on financial inclusion. Key tools in this on-going effort include:

- ❖ **Directed credit for lending to priority sector and weaker sections:** The goal here is to facilitate/enhance credit flow to employment intensive sectors such as agriculture, micro and small enterprises (MSE), as well as for affordable housing and education loans.



- ❖ **Lead Bank Scheme:** A commercial bank is designated as a lead bank in each district in the country and this bank is responsible for ensuring banking development in the district through coordinated efforts between banks and government officials. The Reserve Bank has assigned a Lead District Manager for each district who acts as a catalytic force for promoting financial inclusion and smooth working between government and banks.
- ❖ **Sector specific refinance:** The Reserve Bank makes available refinance to banks against their credit to the export sector. In exceptional circumstances, it can provide refinance against lending to other sectors.
- ❖ **Strengthening and supporting small local banks:** This includes regional rural banks and cooperative banks.
- ❖ **Financial inclusion:** Expanding access to finance and promoting financial literacy are a part of our outreach efforts.

Looking Ahead

The developmental role of the Reserve Bank will continue to evolve, along with the Indian Economy. Through the outreach efforts and emphasis on customer service, the Reserve Bank will continue to make efforts to fill the gaps to promote inclusive economic growth and stability.

Financial Inclusion and Literacy: Expanding Access; Encouraging Education

Expanding access to and knowledge about finance is a fundamental aspect of the Reserve Bank's operations. These efforts are critical to ensuring that the benefits of a growing and healthy economy reach all segments of the population. RBI's activities here include:

- ❖ Encouraging provision of affordable financial services like zero-balance, no-frills bank accounts, access to payments and remittance facilities, savings, loans and insurance services.
- ❖ Expanding banking outreach through use of technology, such as banking by cell phone, smart cards and the like
- ❖ Encouraging bank branch expansion in parts of the country with few banking facilities
- ❖ Facilitating use of specified persons to act as agents to perform banking functions in hard-to-reach parts of the country.

RBI's work to promote financial literacy focuses on educating people about responsible financial management. Efforts here include:

- ❖ **Information and knowledge-sharing:** User-friendly website includes easy-to-understand tips and guidance in multiple languages, brochures, advertisements and other marketing materials educate the public about banking services.
- ❖ **Credit counseling:** The Reserve Bank encourages commercial banks to set up financial literacy and credit counseling centres, to help people develop better financial planning skills.

1.3 BANKING INSTITUTIONS

In recent years India's national economy has developed certain serious economic maladies. In the first instance the economy has become heavily dependent on foreign aid.

The proportion of foreign aid in the Plan Development Programme has been continuously rising since the First Five Year Plan. Since the prospects of the availability of foreign aid in the last two or three years have become very uncertain and rather dim, there has been a slack in the levels of economic activity and employment in the country.

Secondly, there has been the paradox of inflationary recession having come in the economy and tending to become all pervasive. The chief characteristic of the recession is that, while on the one

hand there are large unutilised industrial capacities in the economic system, the supply of raw materials and other components for production of final goods is extremely deficient. The decline of agricultural production explains only a part of this phenomenon, while another part will have to be ascribed to the general shortages in the economy which have been generated as a result of the growing inter-sectoral imbalances caused by the functioning of the financial institutions and the economic system in a particular manner.

The most curious aspect of the present situation is that the price level of industrial and agricultural goods continues to be very high despite the slack in demand. Obviously, the financial system of the country seems to have acquired such characteristics that it is able

to sustain a prolonged holding of goods in the economy without leading to the adjustments of the price level with the existing state of demand and supply.

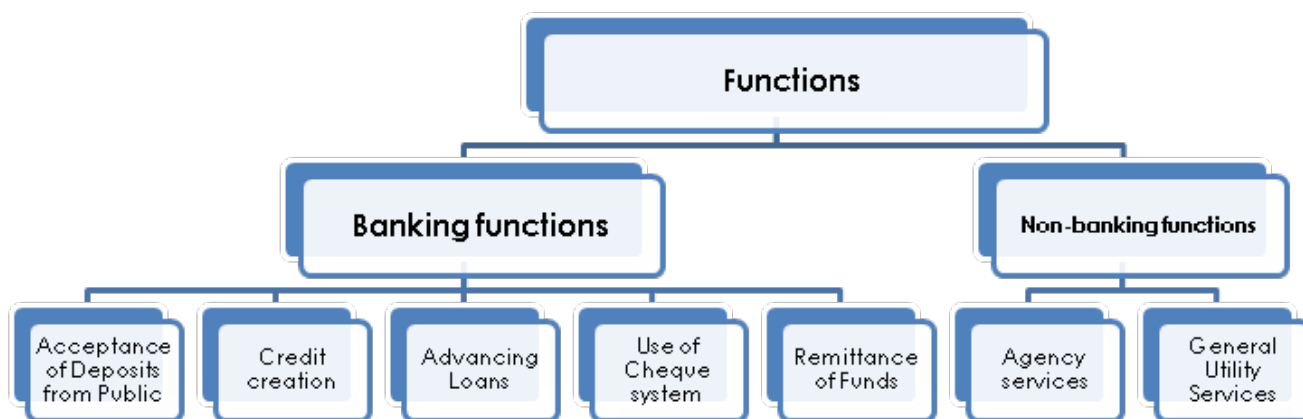
The role of bank credit in the situation is obviously an important factor to be examined in so far as it helps to create the present situation as well as to maintain it for a long period.

In addition, due to various political and economic reasons, both national and international, the perspective of long term development of the economy is tending to get blurred. The commitment to long term programmes of plan development has tended to become weak in recent years and greater attention is being given to measures of policy which seek to attain economic stability rather than economic growth. In this context too, it has become necessary to examine the role that the banking system of the country has played so far in promoting the long term growth of the economy as well as in creating conditions in which further growth of industry and agriculture has been halted in recent years.

1.3.1 Commercial Banks

Commercial banks are a part of an organized money market in India. Commercial banks are joint stock companies dealing in money and credit that accept demand deposits from public which are withdraw able by cheques and use these deposits for lending to others. Deposits are accepted from large group of people in forms of money and deposits are withdraw able on demand. Commercial banks mobilize savings in urban and rural areas and make them available to large & small industrial units and trading units mainly for working capital requirements. Commercial banks provide various types of financial services to customers in return of fees.

Functions: Functions of commercial banks can be divided in 2 groups–Banking functions (primary functions) and non-banking functions (secondary functions).





(i) Banking functions (primary functions): Most of banking functions are:-

(a) Acceptance of deposits from public:- Bank accepts following deposits from public :-

- (i) Demand deposits can be in the form of current account or savings account. These deposits are withdrawable any time by depositors by cheques. Current deposits have no interest or nominal interest. Such accounts are maintained by commercial firms and business man. Interest rate of saving deposits varies with time period. Savings accounts are maintained for encouraging savings of households.
- (ii) Fixed deposits are those deposits which are withdrawable only after a specific period. It earns a higher rate of interest.
- (iii) In recurring deposits, people deposit a fixed sum every month for a fixed period of time.

(b) Advancing loans: It extends loans and advances out of money deposited by public to various business units and to consumers against some approved. Usually banks grant short term or medium term loans to meet requirements of working capital of industrial units and trading units. Banks discourage loans for consumption purposes. Loans may be secured or unsecured. Banks do not give loan in form of cash. They make the customer open account and transfer loan amount in the customer's account.

Banks grant loan in following ways:-

- (i) Overdraft: - Banks grant overdraft facilities to current account holder to draw amount in excess of balance held.
- (ii) Cash credit: - Banks grant credit in cash to current account holder against hypothecation of goods.
- (iii) Discounting trade bills:- The banks facilitate trade and commerce by discounting bills of exchange.
- (iv) Term loan: - Banks grant term loan to traders and to agriculturists against some collateral securities.
- (v) Consumer credit:- Banks grant credit to households in a limited amount to buy durable goods.
- (vi) Money at call or short term advances:- Banks grant loan for a very short period not exceeding 7 days to dealers / brokers in stock exchange against collateral securities.
- (c) Credit creation is another banking function of commercial bank. i.e it manufactures money.
- (d) Use of cheque system: - Banks have introduced the cheque system for withdrawal of deposits. There are two types of cheques – bearer & cross cheque. A bearer cheque is encashable immediately at the bank by its possessor. A crossed cheque is not encashable immediately. It has to be deposited only in the payee's account. It is not negotiable.
- (e) Remittance of funds:- Banks provides facilities to remit funds from one place to another for their customers by issuing bank drafts, mail transfer etc.

(ii) Non Banking functions (secondary functions): Non banking functions are (a) Agency services (b) General utility services

(a) Agency services:- Banks perform following functions on behalf of their customers: -

- i) It makes periodic payments of subscription, rent, insurance premium etc as per standing orders from customers.
- ii) It collects bill, cheques, demand drafts, etc on behalf of their customers
- iii) It acts as a trustee for property of its customers.
- iv) It acts as attorney. It can help in clearing and forwarding goods of its customers.
- v) It acts as correspondents, agents of their clients.

(b) General utility services:- General utility services of commercial banks are as follows:-

- (i) Lockers are provided by bank to its customers at nominal rate.
- (ii) Shares, wills, other valuables documents are kept in safe custody. Banks return them when demanded by its customers.
- (iii) It provides travelers cheque and ATM facilities.
- (iv) Banks maintain foreign exchange department and deal in foreign exchange.
- (v) Banks underwrites issue of shares and debentures of concerns.
- (vi) It compiles statistics and business information relating to trade & commerce.
- (vii) It accepts public provident fund deposits.

Classification:

Commercial banks are classified into (a) scheduled banks and (b) non-scheduled banks.

(a) The scheduled banks (which are scheduled under RBI Act) are sub-grouped into :

- (i) Nationalized scheduled commercial banks having 29,752 branches as on June 30th 1992.
- (ii) Foreign banks into 140 branches.
- (iii) Other non-nationalized scheduled banks with 3,828 branches.

A scheduled bank is so called because it has been included in the second schedule of the Reserve Bank of India Act, 1934. To be eligible for this inclusion, a bank must satisfy the following three conditions:-

- (i) it must have a paid-up capital and reserves of an aggregate value of at least Rs. 5.00 lacs.
- (ii) it must satisfy the RBI that its affairs are not conducted in a manner damaging to the interests of its depositors; and
- (iii) it must be a corporation and not a partnership or a single-owner firm.

Scheduled banks enjoy certain advantages :- (i) Free / concessional remittance facilities through the offices of the RBI and its agents. (ii) Borrowings facilities from the RBI by depositing necessary documents. In return, the scheduled banks are under obligation to:-

- (i) maintain an average daily balance of cash reserves with the RBI at rates stipulated by it; and
- (ii) submit periodical returns to the RBI under various provisions of the Reserve Bank of India Act, 1934 and the Banking Regulation Act, 1949 (as amended from time to time).

All commercial banks such as Indian, foreign, regional rural banks and state co-operative banks are scheduled banks.

(b) Non-scheduled banks are also subject to the statutory cash reserve requirement. But they are not required to keep them with the RBI; they may keep these balances with themselves. They are not entitled to borrow from the RBI for normal banking purposes, though they may approach the RBI for accommodation under abnormal circumstances.

Commercial banks may be classified as (a) Indian and (b) foreign bank.

- (a) Indian banks are those banks which are incorporated in India and whose head offices are in India.
- (b) Foreign banks are those banks which are incorporated outside of India and whose head offices are in outside of India.

Both types of bank will have to maintain cash reserves with the RBI at rates stipulated by it. Besides, RBI can supervise over working of foreign banks operating in India.



Commercial banks may also be classified as 3) (a) Private and (b) Public sector bank.

(a) Private sector banks are those banks whose at least 51% shares are holding by private sectors.

(b) Public sector banks are those banks which are not private sectors.

1.3.2. Cooperative Banks

The State Cooperative Bank is a central institution at the State level which works as a final link in the chain between the small and widely scattered primary societies, on the one hand, and the money market, on the other. It balances the seasonal excess and deficiency of funds and equate the demand for and supply of capital. It takes-off the idle money in the slack season and supplies affiliated societies and Central Co-operative Banks with fluid resources during the busy season. It is the vertex of the pyramidal structure in a state for the provision of short and medium-term credit to agriculturists on co-operative basis. These are formed by joining together all districts central cooperative banks in a particular state. It collects funds by way of share capital, deposits from public, loan from commercial banks etc.

Objective and functions of State Cooperative Banks

The chief objectives of State Cooperative Bank are to coordinate the work of the Central Banks, and to link Cooperative Credit Societies with the general money market and the Reserve Bank of India.

These banks work as real pivots of the Cooperative movement in the state. They act as initial source of credit for seasonal and urgent needs of their members. Their main functions are:-

- (1) They act as banker's bank to the Central Cooperative Banks in the districts. These banks not only mobilise the financial resources needed by the societies, but they also deploy them properly among the various sectors of the movement.
- (2) They coordinate their own policies with those of the cooperative movement and the government.
- (3) They form a connecting link between the cooperative credit societies and the commercial money market and the RBI.
- (4) They formulate and execute uniform credit policies for the cooperative movement as a whole.
- (5) They promote the wise of cooperation in general by granting subsidiaries to the Central Cooperative Banks for the development of cooperative activities.
- (6) They act as a clearing house for capital i.e., money flows from, the Apex Banks to the Central Banks and from the Central Banks to the rural societies and from them to individual borrowers.
- (7) They supervise, control and guide the activities of the Central Bank through regular inspections by their inspection staff and rectify the defects in their work. Thus, they act as their friend, philosopher and guide.
- (8) They also perform general utility functions such as issuing drafts, cheques and letters of credit on various centres and thereby help remittance of funds.
- (9) They collect and discount bills with the permission of the Registrar.
- (10) In certain place they also provide safe deposit locker and facilities for safe custody of valuables.
- (11) They help the state Governments in drawing up Cooperative development and other development plans and in their implementation.

Problems in the working of State Cooperative Banks

The State Cooperative Banks do suffer from the following problems:-

- i) Poor deposits mobilisation: These banks have not been successful in raising deposits as, even now, individual deposits from less than 25 per cent in many States.

- ii) Undesirable investment of funds: These banks are not followed the guide of RBI about the matter of investment of fund. Despite the advice of the RBI, a cautious policy is not being followed in the matter of investment of the funds which agriculture even now utilised for the purchase of shares in other cooperative institutions; or in making huge advances to the primary cooperative societies; and by way of loans to individuals.
- iii) Failure to assess genuineness of borrowing: The banks have failed in assessing the genuineness of the borrowings of the Central Cooperative Banks. This is evidenced from the fact that the credit limits of such banks had been fixed on the basis of their owned funds without taking into account their past performance; and the bank's own financial position.
- iv) Ineffective supervision and inspection: Many of the Banks have not taken up this work in right way. Some of the banks have neither adequate nor separate staff for this work. Officers of these banks sometimes pay only ad-hoc and hurried visits.
- v) Book adjustment: Book adjustments are often made regarding repayment of loans. The State Cooperative Banks have failed to check the fictitious transactions of the Central cooperative Banks.
- vi) Increasing overdues: The overdues of the Banks have been showing a rising trend. This is due to the fact that these banks have not followed the prescribed loaning procedure.
- vii) They utilise their reserve funds as working capital.

Suggestions for Improvement

- (1) Qualified managerial personnel: Managers of these banks should be qualified and trained personnel. No co-operative should be allowed to begin operations until a qualified manager is appointed who commands the confidence of the people and is able to build the organisation.
- (2) Opening of branches : In areas where a Central Co-operative Bank is virtually inoperative and, therefore, unable to finance the agricultural and credit societies, the State Bank should established a branch and finance the credit worthy societies till the Central Bank is organised.
- (3) Effective supervision: The State Co-operative Banks should try to:
 - (i) improve their operational efficiency;
 - (ii) exercise effective control over branches and the supervisory staff, and
 - (iii) make sustained efforts for the recovery of loans.
- (4) Wide membership: The membership of the Bank should be open to all Central Banks and such other co-operative credit institutions as may have direct dealing with it. Restrictions should be imposed on the individual membership.
- (5) Withdrawals of privileges for non-co-operation: Central Co-operative Banks which refuse to co-operate with the State Bank in the matter of supervision and inspection, should be disaffiliated from the State Co-operative Banks and denied all privileges by the administration.
- (6) Other measures : These banks should also make efforts to :
 - (i) implement and accept policies regarding reorganisation of the structure;
 - (ii) adopt the co-operative loan system.
 - (iii) reduce the overdues; and
 - (iv) improve the personnel.



1.3.3 Merchant Banking

Merchant bank may be defined as a kind of financial institution that provides a variety of services such as (i) marketing and underwriting of new issue (ii) investment banking, (iii) management of customer security, (iv) project promotion & project finance (v) merger & takeover related services (vi) portfolios, (vii) insurance, accept of bills etc and (viii) advises in the raising of corporate capital. Therefore, merchant banking is a skill-oriented professional service about financial need of the client.

As per SEBI, Merchant Banker may be defined as any person who is engaged in the business of issue management either by making arrangements regarding selling, buying or subscribing to the securities as manager, consultant, advisor or rendering corporate advisory service in relation to such issue management.

Differences between Merchant Banks and Commercial Banks

The differences between merchant banks and commercial banks are:-

- (i) Commercial banks do banking business i.e. accept deposits and use deposits for giving loan but merchant bank works as consultancy type business i.e. helps in issue of management, in issue of shares etc.
- (ii) The nature of loan given by commercial bank is debt related but loan given by merchant bank is equity related.
- (iii) Commercial bank does not take any risk of client but merchant bank takes risk of client.
- (iv) Commercial bank acts as a financier but merchant bank acts as a financial advisor.
- (v) Commercial Banks are regulated by the Banking Regulation Act, 1949 and is under the control of RBI whereas merchant bankers are governed by rules and regulations framed by SEBI.
- (vi) Commercial banks do mass banking with general public but merchant bank deals with a class of selected clients.

Differences between Merchant Banks and Investment Banks

An investment banker is a firm engaged in financing the capital requirements of business through the capital markets. They act as middlemen between issuers of securities requiring capital and the ultimate investors who make easy the conversion of available savings into investments and serve to improve the flow of capital. Their activities include:

- (a) Revenue generating activities, such as
 - (i) Corporate finance and treasury management
 - (ii) Dealer and brokerage activities
 - (i) Speculation and arbitrage
 - (ii) Corporate restructuring
 - (iii) Financial engineering and
 - (iv) Other activities like advisory services, investment management, merchant banking, venture capital and consulting.
- (b) Support services such as clearing, research, internal finance and funding and information services.

Thus, the range of services offered by merchant banker is similar to those of investment bankers. But merchant banking is fee-based as it involves the provision of different kinds of services and investment banking is both fee-based & fund-based, as it involves the provision of services as well as making investments.

Differences between Merchant Banks and Development Banks

Development Banks are specialised financial institutions that act as financial intermediaries when credit is not available through normal channels. The funding offered is essentially for industrial and agricultural development in the nature of medium or long term loans.

They seek to mobilize scarce resources such as capital, technology, entrepreneurial and managerial talents and channelise them into industrial activities in accordance with plan priorities. Its objectives are to develop the specific sectors and to improve the economy in general.

The services offered by development banks and their objectives are different from those of merchant banks. In India, development banks are usually statutory corporations while merchant banks are essentially corporate form of organisation.

Nature and Scope of Merchant Banking Activities

Merchant banking is a skill-oriented professional service about financial need of the client. It helps :-

- (i) to control the financial surplus of the common people into productive sectors.
- (ii) to co-ordinate the activities of various intermediaries to the share issue such as registrar, bankers, advertising agency, printers, underwriters, brokers etc.
- (iii) to ensure fulfilment of all rules and regulations of the securities market.

1.4 SECURITIES AND EXCHANGE BOARD OF INDIA (SEBI)

1.4.1. Establishment

The Securities and Exchange Board of India was established on April 12, 1992 in accordance with the provisions of the Securities and Exchange Board of India Act, 1992.

1.4.2. Preamble

The Preamble of the Securities and Exchange Board of India describes the basic functions of the Securities and Exchange Board of India as “...to **protect the interests of investors in securities and to promote the development of, and to regulate the securities market and for matters connected therewith or incidental thereto**”

1.4.3. Role of SEBI or Steps Taken by SEBI for the Development of Capital Markets in India

To introduce improved practices and greater transparency in the capital markets and for capital market development, the roles of SEBI are:

1. SEBI has drawn up a programme for inspecting stock exchanges. Under this programme, inspections of some stock exchanges have already been carried out. The basic objective of such inspections is to improve the functioning of stock exchanges.
2. SEBI has been authorised to conduct inspections of various mutual funds. In this respect, it has already undertaken inspection of some mutual funds. Various deficiencies of the individual mutual funds have been pointed out in the inspection reports and corrective steps undertaken to rectify these deficiencies.
3. SEBI has introduced a number of measures to reform the primary market in order to make stronger the standards of disclosure. SEBI has introduced certain procedural norms for the issuers and intermediaries, and removed the inadequacies and systemic deficiencies in the issue procedures.
4. The process of registration of intermediaries such as stockbrokers has been provided under the provisions of the Securities and Exchange Board of India Act, 1992.
5. In order to encourage companies to exercise greater care for timely actions in matters relating to the public issue of capital. SEBI has advised the stock exchanges to collect from companies



making public issues, a deposit of 1 % of the issue amount which could be forfeited in case of non-compliance with the provisions of the listing agreement and non-despatch of refund orders and share certificates by registered post within the prescribed time.

6. Through an order under the Securities Contracts (Regulations) Act 1956, SEBI has directed the stock exchanges to broad base their governing boards and change the composition of their arbitration, default and disciplinary committees. The broad basing of the governing boards of the stock exchanges would help them function with greater degree of autonomy and independence or that they become truly self-regulatory organizations.
7. Merchant banking has been statutorily brought under the regulatory framework of SEBI. The merchant bankers have to be authorised by SEBI. They will have to hold to specific capital adequacy norms and bear by a code of conduct, which specifies a high degree of responsibility towards inspectors in respect of the pricing and premium fixation of issues.
8. SEBI issued regulations pertaining to "Insider Trading" in November 1992 prohibiting dealings, communication in matters relating to insider trading. Such regulations will help in protecting the market's integrity, and in the long run inspire investor confidence in the market.
9. SEBI issued a separate set of guidelines for development financial institutions in September 1992 for disclosure and investment protection regarding their raising of funds from the market. As per the guidelines, there is no need for promoter's contribution. Besides, underwriting is not mandatory.
10. SEBI has notified the regulations for mutual funds. For the first time mutual fund's are governed by a uniform set of regulations which require them to be formed as trusts and managed by a separate Asset Management Company (AMC) and supervised by a board of trustees. SEBI (Mutual fund) regulations provide for laissez-faire relationship between the various constituents of the mutual funds and thus bring about a structural change which will ensure qualitative improvement in the functioning of the mutual funds and require that the AMCs have a minimum net worth of Rs. 6 crores of which the sponsors must contribute at least 40 percent. The SEBS (Mutual Fund) Regulations also provide for an approval of the offer documents of schemes by SEBI. The regulations are intended to ensure that the mutual funds grow on healthy lines and investors' interest is protected.
11. To bring about greater transparency in transactions, SEBI has made it mandatory for brokers to maintain separate accounts for their clients and for themselves. They must disclose the transaction price and brokerage separately in the contract notes issued to their clients. They must also have their books audited and audit reports filed with SEBI.
12. SEBI has issued directives to the stock exchanges to ensure that contract notes are issued by brokers to clients within 24 hours of the execution of the contract. Exchanges are to see that time limits for payment of sale proceeds and deliveries by brokers and payment of margins by clients to brokers are complied with.
13. In August 1994, guidelines were issued in respect of preferential issues for orderly development of the securities market and to protect the interest of investors.
14. The 'Banker to the issue' has been brought under purview of SEBI for investor protection. Unit Trust of India (UTI) has also been brought under the regulatory jurisdiction of SEBI.
15. In July 1995, the Committee set up by SEBI under the chairmanship of Y. H. Malegam to look into the disclosure of norms for public issues, recommended stricter regulations to control irregularities affecting the primary market. Following the recommendations of the Malegam Committee, SEBI issued a number of guidelines in September and October 1995 to protect the interest of investors.
16. A series of measures to control the prices and to check other malpractices on the stock exchanges were announced by SEBI on December 21, 1995
17. Guidelines for reduction the entry norms for companies accessing capital market were issued by SEBI on April 16, 1996.

The above discussion shows that SEBI has undertaken a number of steps to establish a fair, transparent and a strong regulatory structure for the efficient functioning of the capital market and for protecting the interest of the investors. These steps have helped in developing the capital market on healthy lines.

1.5 NON-BANKING FINANCIAL COMPANY (NBFC)

The Reserve Bank of India is entrusted with the responsibility of regulating and supervising the Non-Banking Financial Companies by virtue of powers vested in Chapter III B of the Reserve Bank of India Act, 1934. The regulatory and supervisory objective is to:

- a) ensure healthy growth of the financial companies;
- b) ensure that these companies function as a part of the financial system within the policy framework, in such a manner that their existence and functioning do not lead to systemic aberrations; and that
- c) the quality of surveillance and supervision exercised by the Bank over the NBFCs is sustained by keeping pace with the developments that take place in this sector of the financial system.

It has been felt necessary to explain the rationale underlying the regulatory changes and provide clarification on certain operational matters for the benefit of the NBFCs, members of public, rating agencies, Chartered Accountants etc. To meet this need, the clarifications in the form of questions and answers, is being brought out by the Reserve Bank of India (Department of Non-Banking Supervision) with the hope that it will provide better understanding of the regulatory framework.

The information given below is of general nature for the benefit of depositors/public and the clarifications given do not substitute the extant regulatory directions/instructions issued by the Bank to the NBFCs.

1.5.1 Definition

A Non-Banking Financial Company (NBFC) is a company registered under the Companies Act, 1956 engaged in the business of loans and advances, acquisition of shares/stocks/bonds/debentures/securities issued by Government or local authority or other marketable securities of a like nature, leasing, hire-purchase, insurance business, chit business but does not include any institution whose principal business is that of agriculture activity, industrial activity, purchase or sale of any goods (other than securities) or providing any services and sale/purchase/construction of immovable property. A non-banking institution which is a company and has principal business of receiving deposits under any scheme or arrangement in one lump sum or in installments by way of contributions or in any other manner, is also a non-banking financial company (Residuary non-banking company).

1.5.2 Difference between banks & NBFCs

NBFCs lend and make investments and hence their activities are akin to that of banks; however there are a few differences as given below:

- (i) NBFC cannot accept demand deposits;
- (ii) NBFCs do not form part of the payment and settlement system and cannot issue cheques drawn on itself;
- (iii) Deposit insurance facility of Deposit Insurance and Credit Guarantee Corporation is not available to depositors of NBFCs, unlike in case of banks.

1.5.3 Registration requirement of NBFCs

In terms of Section 45-IA of the RBI Act, 1934, no Non-banking Financial company can commence or carry on business of a non-banking financial institution without a) obtaining a certificate of registration from the Bank and without having a Net Owned Funds of ₹ 25 lakhs (₹ two crore since April 1999). However, in terms of the powers given to the Bank, to obviate dual regulation, certain categories of NBFCs which are regulated by other regulators are exempted from the requirement of registration with



RBI viz. Venture Capital Fund/Merchant Banking companies/Stock broking companies registered with SEBI, Insurance Company holding a valid Certificate of Registration issued by IRDA, Nidhi companies as notified under Section 620A of the Companies Act, 1956, Chit companies as defined in clause (b) of Section 2 of the Chit Funds Act, 1982, Housing Finance Companies regulated by National Housing Bank, Stock Exchange or a Mutual Benefit company.

1.5.4 Different types/categories of NBFCs registered with RBI

NBFCs are categorized a) in terms of the type of liabilities into Deposit and Non-Deposit accepting NBFCs, b) non deposit taking NBFCs by their size into systemically important and other non-deposit holding companies (NBFC-NDSI and NBFC-ND) and c) by the kind of activity they conduct. Within this broad categorization the different types of NBFCs are as follows:

- (i) **Asset Finance Company (AFC)** : An AFC is a company which is a financial institution carrying on as its principal business the financing of physical assets supporting productive/economic activity, such as automobiles, tractors, lathe machines, generator sets, earth moving and material handling equipments, moving on own power and general purpose industrial machines. Principal business for this purpose is defined as aggregate of financing real/physical assets supporting economic activity and income arising therefrom is not less than 60% of its total assets and total income respectively.
- (ii) **Investment Company (IC)** : IC means any company which is a financial institution carrying on as its principal business the acquisition of securities,
- (iii) **Loan Company (LC)**: LC means any company which is a financial institution carrying on as its principal business the providing of finance whether by making loans or advances or otherwise for any activity other than its own but does not include an Asset Finance Company.
- (iv) **Infrastructure Finance Company (IFC)**: IFC is a non-banking finance company (a) which deploys at least 75 per cent of its total assets in infrastructure loans, (b) has a minimum Net Owned Funds of ₹ 300 crores, (c) has a minimum credit rating of 'A 'or equivalent (d) and a CRAR of 15%.
- (v) **Systemically Important Core Investment Company (CIC-ND-SI)**: CIC-ND-SI is an NBFC carrying on the business of acquisition of shares and securities which satisfies the following conditions:-
 - (a) it holds not less than 90% of its Total Assets in the form of investment in equity shares, preference shares, debt or loans in group companies;
 - (b) its investments in the equity shares (including instruments compulsorily convertible into equity shares within a period not exceeding 10 years from the date of issue) in group companies constitutes not less than 60% of its Total Assets;
 - (c) it does not trade in its investments in shares, debt or loans in group companies except through block sale for the purpose of dilution or disinvestment;
 - (d) it does not carry on any other financial activity referred to in Section 45I(c) and 45I(f) of the RBI act, 1934 except investment in bank deposits, money market instruments, government securities, loans to and investments in debt issuances of group companies or guarantees issued on behalf of group companies.
 - (e) Its asset size is ₹ 100 crores or above and
 - (f) It accepts public funds
- (vi) **Infrastructure Debt Fund: Non- Banking Financial Company (IDF-NBFC)**: IDF-NBFC is a company registered as NBFC to facilitate the flow of long term debt into infrastructure projects. IDF-NBFC raise resources through issue of Rupee or Dollar denominated bonds of minimum 5 year maturity. Only Infrastructure Finance Companies (IFC) can sponsor IDF-NBFCs.

(vii) Non-Banking Financial Company - Micro Finance Institution (NBFC-MFI): NBFC-MFI is a non-deposit taking NBFC having not less than 85% of its assets in the nature of qualifying assets which satisfy the following criteria:

- (a) loan disbursed by an NBFC-MFI to a borrower with a rural household annual income not exceeding ₹ 60,000 or urban and semi-urban household income not exceeding ₹ 1,20,000;
- (b) loan amount does not exceed ₹ 35,000 in the first cycle and ₹ 50,000 in subsequent cycles;
- (c) total indebtedness of the borrower does not exceed ₹ 50,000;
- (d) tenure of the loan not to be less than 24 months for loan amount in excess of ₹ 15,000 with prepayment without penalty;
- (e) loan to be extended without collateral;
- (f) aggregate amount of loans, given for income generation, is not less than 75 per cent of the total loans given by the MFIs;
- (g) loan is repayable on weekly, fortnightly or monthly installments at the choice of the borrower

(viii) Non-Banking Financial Company – Factors (NBFC-Factors): NBFC-Factor is a non-deposit taking NBFC engaged in the principal business of factoring. The financial assets in the factoring business should constitute at least 75 percent of its total assets and its income derived from factoring business should not be less than 75 percent of its gross income.

1.5.5 Requirements for registration with RBI

A company incorporated under the Companies Act, 1956 and desirous of commencing business of non-banking financial institution as defined under Section 45 I (a) of the RBI Act, 1934 should comply with the following:

- (i) it should be a company registered under Section 3 of the companies Act, 1954
- (ii) It should have a minimum net owned fund of ₹ 200 lakhs. (The minimum net owned fund (NOF) required for specialized NBFCs like NBFC-MFIs, NBFC-Factors, CICs.

1.5.6 Procedure for application to the Reserve Bank for Registration

The applicant company is required to apply online and submit a physical copy of the application along with the necessary documents to the Regional Office of the Reserve Bank of India. The application can be submitted online by accessing RBI's secured website <https://secweb.rbi.org.in/COSMOS/rbilogin>. **do.** At this stage, the applicant company will not need to log on to the COSMOS application and hence user ids are not required.). The company can click on "CLICK" for Company Registration on the login page of the COSMOS Application. A window showing the Excel application form available for download would be displayed. The company can then download suitable application form (i.e. NBFC or SC/RC) from the above website, key in the data and upload the application form. The company may note to indicate the correct name of the Regional Office in the field "C-8" of the "Annex-Identification Particulars" in the Excel application form. The company would then get a Company Application Reference Number for the CoR application filed on-line. Thereafter, the company has to submit the hard copy of the application form (indicating the online Company Application Reference Number, along with the supporting documents, to the concerned Regional Office. The company can then check the status of the application from the above mentioned secure address, by keying in the acknowledgement number.

1.5.7 Essential documents required to be submitted along with the application form to the Regional Office of the Reserve Bank

A hard copy of the application form is available at www.rbi.org.in → Site Map → NBFC List → Forms and Returns. An indicative checklist of the documents required to be submitted along with the application can be accessed from www.rbi.org.in → Site Map → NBFC List → Forms and Returns → Documents required for registration as NBFCs.



1.5.8 Acceptance of Public Deposit

All NBFCs are not entitled to accept public deposits. Only those NBFCs to which the Bank had given a specific authorisation are allowed to accept/hold public deposits.

Ceiling on acceptance of Public Deposits and the rate of interest and period of deposit which NBFCs can accept The ceiling on acceptance of Public Deposits by NBFCs authorized to accept deposits.. An NBFC maintaining required minimum NOF,/Capital to Risk Assets Ratio (CRAR) and complying with the prudential norms can accept public deposits as follows:

Category of NBFC having minimum NOF of ₹ 200 lakhs	Ceiling on public deposit
AFC* maintaining CRAR of 15% without credit rating	1.5 times of NOF or ₹ 10 crore whichever is less
AFC with CRAR of 12% and having minimum investment grade credit rating	4 times of NOF
LC/IC** with CRAR of 15% and having minimum investment grade credit rating	1.5 times of NOF
* AFC = Asset Finance Company ** LC/IC = Loan company/Investment Company	

As has been notified on June 17, 2008 the ceiling on level of public deposits for NBFCs accepting deposits but not having minimum Net Owned Fund of ₹ 200 lakh is revised as under:

Category of NBFC having NOF more than ₹ 25 lakh but less than ₹ 200 lakh	Revised Ceiling on public deposits
AFCs maintaining CRAR of 15% without credit rating	Equal to NOF
AFCs with CRAR of 12% and having minimum investment grade credit rating	1.5 times of NOF
LCs/ICs with CRAR of 15% and having minimum investment grade credit rating	Equal to NOF

Presently, the maximum rate of interest an NBFC can offer is 12.5%. The interest may be paid or compounded at rests not shorter than monthly rests.

The NBFCs are allowed to accept/renew public deposits for a minimum period of 12 months and maximum period of 60 months. They cannot accept deposits repayable on demand.

1.5.9 Salient features of NBFCs regulations which the depositor may note at the time of investment

Some of the important regulations relating to acceptance of deposits by NBFCs are as under:

- The NBFCs are allowed to accept/renew public deposits for a minimum period of 12 months and maximum period of 60 months. They cannot accept deposits repayable on demand.
- NBFCs cannot offer interest rates higher than the ceiling rate prescribed by RBI from time to time. The present ceiling is 12.5 per cent per annum. The interest may be paid or compounded at rests not shorter than monthly rests.
- NBFCs cannot offer gifts/incentives or any other additional benefit to the depositors.
- NBFCs (except certain AFCs) should have minimum investment grade credit rating.
- The deposits with NBFCs are not insured.
- The repayment of deposits by NBFCs is not guaranteed by RBI.
- Certain mandatory disclosures are to be made about the company in the Application Form issued by the company soliciting deposits.

1.5.10 'Deposit' and 'Public Deposit'

The term 'deposit' is defined under Section 45 I(bb) of the RBI Act, 1934. 'Deposit' includes and shall be deemed always to have included any receipt of money by way of deposit or loan or in any other form but does not include:

- (i) amount raised by way of share capital, or contributed as capital by partners of a firm;
- (ii) amount received from a scheduled bank, a co-operative bank, a banking company, Development bank, State Financial Corporation, IDBI or any other institution specified by RBI;
- (iii) amount received in ordinary course of business by way of security deposit, dealership deposit, earnest money, advance against orders for goods, properties or services;
- (iv) amount received by a registered money lender other than a body corporate;
- (v) amount received by way of subscriptions in respect of a 'Chit'.

Paragraph 2(1)(xii) of the Non-Banking Financial Companies Acceptance of Public Deposits (Reserve Bank) Directions, 1998 defines a ' public deposit' as a 'deposit' as defined under Section 45 I(bb) of the RBI Act, 1934 and further excludes the following:

- (i) amount received from the Central/State Government or any other source where repayment is guaranteed by Central/State Government or any amount received from local authority or foreign government or any foreign citizen/authority/person;
- (ii) any amount received from financial institutions specified by RBI for this purpose;
- (iii) any amount received by a company from any other company;
- (iv) amount received by way of subscriptions to shares, stock, bonds or debentures pending allotment or by way of calls in advance if such amount is not repayable to the members under the articles of association of the company;
- (v) amount received from shareholders by private company;
- (vi) amount received from directors or relative of the director of an NBFC;
- (vii) amount raised by issue of bonds or debentures secured by mortgage of any immovable property or other asset of the company subject to conditions;
- (viii) the amount brought in by the promoters by way of unsecured loan;
- (ix) amount received from a mutual fund;
- (x) any amount received as hybrid debt or subordinated debt;
- (xi) any amount received by issuance of Commercial Paper.
- (xii) any amount received by a systemically important non-deposit taking non-banking financial company by issuance of 'perpetual debt instruments'
- (xiii) any amount raised by the issue of infrastructure bonds by an Infrastructure Finance Company

Thus, the directions exclude from the definition of public deposit, amount raised from certain set of informed lenders who can make independent decision.

Debentures secured by the mortgage of any immovable property of the company or by any other asset or with an option to convert them into shares in the company , if the amount raised does not exceed the market value of the said immovable property or other assets, are excluded from the definition of 'Public Deposit' in terms of Non-Banking Financial Companies Acceptance of Public Deposits (Reserve Bank) Directions, 1998. Secured debentures are debt instruments and are regulated by Securities & Exchange Board of India.



NBFCs can't accept deposits from NRIs

Effective from April 24, 2004, NBFCs cannot accept deposits from NRIs except deposits by debit to NRO account of NRI provided such amount does not represent inward remittance or transfer from NRE/ FCNR (B) account. However, the existing NRI deposits can be renewed.

1.5.11 Nomination facility to the Depositors of NBFCs

Nomination facility is available to the depositors of NBFCs. The Rules for nomination facility are provided for in section 45QB of the Reserve Bank of India Act, 1934. Non-Banking Financial Companies have been advised to adopt the Banking Companies (Nomination) Rules, 1985 made under Section 45ZA of the Banking Regulation Act, 1949. Accordingly, depositor/s of NBFCs are permitted to nominate one person to whom the NBFC can return the deposit in the event of the death of the depositor/s. NBFCs are advised to accept nominations made by the depositors in the form similar to one specified under the said rules, viz Form DA 1 for the purpose of nomination, and Form DA2 and DA3 for cancellation of nomination and change of nomination respectively.

1.5.12 Certain points need to be bear in mind by depositor while depositing money with NBFCs

While making deposits with an NBFC, the following aspects should be borne in mind:

- (i) Public deposits are unsecured.
- (ii) A proper deposit receipt is issued, giving details such as the name of the depositor/s, the date of deposit, the amount in words and figures, rate of interest payable and the date of repayment of matured deposit along with the maturity amount. Depositor/s should insist on the above and also ensure that the receipt is duly signed and stamped by an officer authorised by the company on its behalf.
- (iii) In the case of brokers/agents etc collecting public deposits on behalf of NBFCs, the depositors should satisfy themselves that the brokers/agents are duly authorized by the NBFC.
- (iv) The Reserve Bank of India does not accept any responsibility or guarantee about the present position as to the financial soundness of the company or for the correctness of any of the statements or representations made or opinions expressed by the company and for repayment of deposits/ discharge of the liabilities by the company.
- (v) Deposit Insurance facility is not available to the depositors of NBFCs.

1.5.13 Rating of NBFCs for acceptance of deposit

An unrated NBFC, except certain Asset Finance companies (AFC), cannot accept public deposits. An exception is made in case of unrated AFC companies with CRAR of 15% which can accept public deposit without having a credit rating upto a certain ceiling depending upon its Net Owned Funds (refer answer to Q 10). NBFC may get itself rated by any of the five rating agencies namely, CRISIL, CARE, ICRA and FITCH, Ratings India Pvt. Ltd and Brickwork Ratings India Pvt. Ltd

1.5.14 Symbols of minimum investment grade rating of different companies

The symbols of minimum investment grade rating of the Credit rating agencies are:

Name of rating agencies	Nomenclature of minimum investment grade credit rating (MIGR)
CRISIL	FA- (FA MINUS)
ICRA	MA- (MA MINUS)
CARE	CARE BBB (FD)
FITCH Ratings India Pvt. Ltd.	tA-(ind)(FD)
Brickwork Ratings India Pvt. Ltd.	BWR FA (FD)

It may be added that A- is not equivalent to A, AA- is not equivalent to AA and AAA- is not equivalent to AAA

An NBFC cannot accept deposit without rating (except an Asset Finance Company complying with prudential norms and having CRAR of 15%, as explained above.

If rating of an NBFC is downgraded to below minimum investment grade rating, it has to stop accepting public deposits, report the position within fifteen working days to the RBI and bring within three years from the date of such downgrading of credit rating, the amount of public deposit to nil or to the appropriate extent permissible under paragraph 4(4) of Non-Banking Financial Companies Acceptance of Public Deposits (Reserve Bank) Directions, 1998.

1.5.15 Defaults in repayment of deposit by NBFCs

If an NBFC defaults in repayment of deposit, the depositor can approach Company Law Board or Consumer Forum or file a civil suit in a court of law to recover the deposits.

1.5.16 Role of Company Law Board in protecting the interest of depositors

When an NBFC fails to repay any deposit or part thereof in accordance with the terms and conditions of such deposit, the Company Law Board (CLB) either on its own motion or on an application from the depositor, directs by order the Non-Banking Financial Company to make repayment of such deposit or part thereof forthwith or within such time and subject to such conditions as may be specified in the order. After making the payment, the company will need to file the compliance with the local office of the Reserve Bank of India.

As explained above, the depositor can approach CLB by mailing an application in prescribed form to the appropriate bench of the Company Law Board according to its territorial jurisdiction alongwith the prescribed fee.

1.5.17 Appointment of Official Liquidators and its procedure

An Official Liquidator is appointed by the court after giving the company reasonable opportunity of being heard in a winding up petition. The liquidator performs the duties of winding up of the company and such duties in reference thereto as the court may impose. Where the court has appointed an official liquidator or provisional liquidator, he becomes custodian of the property of the company and runs day-to-day affairs of the company. He has to draw up a statement of affairs of the company in prescribed form containing particulars of assets of the company, its debts and liabilities, names/residences/occupations of its creditors, the debts due to the company and such other information as may be prescribed. The scheme is drawn up by the liquidator and same is put up to the court for approval. The liquidator realizes the assets of the company and arranges to repay the creditors according to the scheme approved by the court. The liquidator generally inserts advertisement in the newspaper inviting claims from depositors/investors in compliance with court orders. Therefore, the investors/depositors should file the claims within due time as per such notices of the liquidator. The Reserve Bank also provides assistance to the depositors in furnishing addresses of the official liquidator.

A depositor can approach any or all of the redressal authorities i.e consumer forum, court or CLB.

1.5.18 No Ombudsman for hearing complaints against NBFCs

There is no Ombudsman for hearing complaints against NBFCs. However, in respect of credit card operations of an NBFC, if a complainant does not get satisfactory response from the NBFC within a maximum period of thirty (30) days from the date of lodging the complaint, the customer will have the option to approach the Office of the concerned Banking Ombudsman for redressal of his grievance/s.

All NBFCs have in place a Grievance Redressal Officer, whose name and contact details have to be mandatorily displayed in the premises of the NBFCs. The grievance can be taken up with the Grievance Redressal Officer. In case the complainant is not satisfied with the settlement of the complaint by the Grievance Redressal Officer of the NBFC, he/she may approach the nearest office of the Reserve Bank



of India with the complaint. The detail of the Office of the Reserve Bank has also to be mandatorily displayed in the premises of the NBFC.

1.5.19 Various prudential regulations applicable to NBFCs

The Bank has issued detailed directions on prudential norms, vide Non-Banking Financial Companies Prudential Norms (Reserve Bank) Directions, 1998. The directions inter alia, prescribe guidelines on income recognition, asset classification and provisioning requirements applicable to NBFCs, exposure norms, constitution of audit committee, disclosures in the balance sheet, requirement of capital adequacy, restrictions on investments in land and building and unquoted shares, loan to value (LTV) ratio for NBFCs predominantly engaged in business of lending against gold jewellery, besides others. Deposit accepting NBFCs have also to comply with the statutory liquidity requirements. Details of the prudential regulations applicable to NBFC holding deposits and those not holding deposits is available in the DNBS section of master Circulars in the RBI website www.rbi.org.in → sitemap → Master Circulars.

1.5.20 'Owned Fund' and 'Net Owned Fund' in relation to NBFCs

'Owned Fund' means aggregate of the paid-up equity capital, preference shares which are compulsorily convertible into equity, free reserves, balance in share premium account and capital reserves representing surplus arising out of sale proceeds of asset, excluding reserves created by revaluation of asset, after deducting therefrom accumulated balance of loss, deferred revenue expenditure and other intangible assets. 'Net Owned Fund' is the amount as arrived at above, minus the amount of investments of such company in shares of its subsidiaries, companies in the same group and all other NBFCs and the book value of debentures, bonds, outstanding loans and advances including hire purchase and lease finance made to and deposits with subsidiaries and companies in the same group, to the extent it exceeds 10% of the owned fund.

1.5.21 Responsibilities of the NBFCs accepting/holding public deposits with regard to submission of Returns and other information to RBI

The NBFCs accepting public deposits should furnish to RBI

- (i) Audited balance sheet of each financial year and an audited profit and loss account in respect of that year as passed in the annual general meeting together with a copy of the report of the Board of Directors and a copy of the report and the notes on accounts furnished by its Auditors;
- (ii) Statutory Quarterly Return on deposits - NBS 1;
- (iii) Certificate from the Auditors that the company is in a position to repay the deposits as and when the claims arise;
- (iv) Quarterly Return on prudential norms-NBS 2;
- (v) Quarterly Return on liquid assets-NBS 3;
- (vi) Annual return of critical parameters by a rejected company holding public deposits – NBS 4
- (vii) Half-yearly ALM Returns by companies having public deposits of ₹ 20 crores and above or asset size of ₹ 100 crores and above irrespective of the size of deposits holding
- (viii) Monthly return on exposure to capital market by deposit taking NBFC with total assets of ₹ 100 crores and above–NBS 6; and
- (ix) A copy of the Credit Rating obtained once a year

Documents or the compliance required to be submitted to the Reserve Bank of India by the NBFCs not accepting/holding public deposits

- A. The NBFCs having assets of ₹ 100 crores and above but not accepting public deposits are required to submit:
 - (i) Quarterly statement of capital funds, risk weighted assets, risk asset ratio etc., for the company – NBS 7

- (ii) Monthly Return on Important Financial Parameters of the company
 - (iii) Asset- Liability Management (ALM) returns:
 - (iv) Statement of short term dynamic liquidity in format ALM [NBS-ALM1] -Monthly,
 - (v) Statement of structural liquidity in format ALM [NBS-ALM2] Half Yearly
 - (vi) Statement of Interest Rate Sensitivity in format ALM -[NBS-ALM3], Half yearly
- B. The non deposit taking NBFCs having assets of more than ₹ 50 crores and above but less than ₹ 100 crores are required to submit Quarterly return on important financial parameters of the company. Basic information like name of the company, address, NOF, profit / loss during the last three years has to be submitted quarterly by non-deposit taking NBFCs with asset size between ₹ 50 crores and ₹ 100 crores.

All companies not accepting public deposits have to pass a board resolution to the effect that they have neither accepted public deposit nor would accept any public deposit during the year.

However, all the NBFCs (other than those exempted) are required to be registered with RBI and also make sure that they continue to be eligible to retain the Registration. Further, all NBFCs (including non-deposit taking) should submit a certificate from their Statutory Auditors every year to the effect that they continue to undertake the business of NBFI requiring holding of CoR under Section 45-IA of the RBI Act, 1934.

NBFCs are also required to furnish the information in respect of any change in the composition of its Board of Directors, address of the company and its Directors and the name/s and official designations of its principal officers and the name and office address of its Auditors. With effect from April 1, 2007, non-deposit taking NBFCs with assets of ₹ 100 crores and above were advised to maintain minimum CRAR of 10% and also comply with single/group exposure norms. As on date, such NBFCs are required to maintain a minimum CRAR of 15%.

1.5.22 The NBFCs have been made liable to pay interest on the overdue matured deposits if the company has not been able to repay the matured public deposits on receipt of a claim from the depositor.

As per Reserve Bank's Directions, overdue interest is payable to the depositors in case the company has delayed the repayment of matured deposits, and such interest is payable from the date of receipt of such claim by the company or the date of maturity of the deposit whichever is later, till the date of actual payment. If the depositor has lodged his claim after the date of maturity, the company would be liable to pay interest for the period from the date of claim till the date of repayment. For the period between the date of maturity and the date of claim it is the discretion of the company to pay interest.

1.5.23 Pre-payment of Public Deposits

An NBFC accepts deposits under a mutual contract with its depositors. In case a depositor requests for pre-mature payment, Reserve Bank of India has prescribed Regulations for such an eventuality in the Non-Banking Financial Companies Acceptance of Public Deposits (Reserve Bank) Directions, 1998 wherein it is specified that NBFCs cannot grant any loan against a public deposit or make premature repayment of a public deposit within a period of three months (lock-in period) from the date of its acceptance. However, in the event of death of a depositor, the company may, even within the lock-in period, repay the deposit at the request of the joint holders with survivor clause / nominee / legal heir only against submission of relevant proof, to the satisfaction of the company.

A NBFC, (which is not a problem company) subject to above provisions, may permit after the lock-in period, premature repayment of a public deposit at its sole discretion, at the rate of interest as prescribed by the Bank.

A problem NBFC is prohibited from making premature repayment of any deposits or granting any loan against public deposit/deposits, as the case may be. The prohibition shall not, however, apply in the



case of death of depositor or repayment of tiny deposits i.e. up to ₹ 10000/- subject to lock in period of 3 months in the latter case.

1.5.24 Liquid assets requirement for the deposit taking companies

In terms of Section 45-IB of the RBI Act, 1934, the minimum level of liquid assets to be maintained by NBFCs is 15 per cent of public deposits outstanding as on the last working day of the second preceding quarter. Of the 15%, NBFCs are required to invest not less than ten percent in approved securities and the remaining 5% can be in unencumbered term deposits with any scheduled commercial bank. Thus, the liquid assets may consist of Government securities, Government guaranteed bonds and term deposits with any scheduled commercial bank.

The investment in Government securities should be in dematerialised form which can be maintained in Constituents' Subsidiary General Ledger (CSGL) Account with a scheduled commercial bank (SCB) / Stock Holding Corporation of India Limited (SHCIL). In case of Government guaranteed bonds the same may be kept in dematerialised form with SCB/SHCIL or in a dematerialised account with depositories [National Securities Depository Ltd. (NSDL)/Central Depository Services (India) Ltd. (CDSL)] through a depository participant registered with Securities & Exchange Board of India (SEBI). However in case there is Government bonds which are in physical form the same may be kept in safe custody of SCB/SHCIL.

NBFCs have been directed to maintain the mandated liquid asset securities in a dematerialised form with the entities stated above at a place where the registered office of the company is situated. However, if an NBFC intends to entrust the securities at a place other than the place at which its registered office is located, it may do so after obtaining the permission of RBI in writing. It may be noted that liquid assets in approved securities will have to be maintained in dematerialised form only.

The liquid assets maintained as above are to be utilised for payment of claims of depositors. However, deposits being unsecured in nature, depositors do not have direct claim on liquid assets.

1.5.25 NBFCs- Exempted from registration

Housing Finance Companies, Merchant Banking Companies, Stock Exchanges, Companies engaged in the business of stock-broking/sub-broking, Venture Capital Fund Companies, Nidhi Companies, Insurance companies and Chit Fund Companies are NBFCs but they have been exempted from the requirement of registration under Section 45-IA of the RBI Act, 1934 subject to certain conditions.

Housing Finance Companies are regulated by National Housing Bank, Merchant Banker/Venture Capital Fund Company/stock-exchanges/stock brokers/sub-brokers are regulated by Securities and Exchange Board of India, and Insurance companies are regulated by Insurance Regulatory and Development Authority. Similarly, Chit Fund Companies are regulated by the respective State Governments and Nidhi Companies are regulated by Ministry of Corporate Affairs, Government of India.

It may also be mentioned that Mortgage Guarantee Companies have been notified as Non-Banking Financial Companies under Section 45 I(f)(iii) of the RBI Act, 1934.

1.5.26 Entities (not companies) which carry on activities like that of NBFCs

Any person who is an individual or a firm or unincorporated association of individuals cannot accept deposits except by way of loan from relatives, if his/its business wholly or partly includes loan, investment, hire-purchase or leasing activity or principal business is that of receiving of deposits under any scheme or arrangement or in any manner or lending in any manner.

1.5.27 Residuary Non-Banking Company (RNBC)

Residuary Non-Banking Company is a class of NBFC which is a company and has as its principal business the receiving of deposits, under any scheme or arrangement or in any other manner and not being Investment, Asset Financing, Loan Company. These companies are required to maintain investments as per directions of RBI, in addition to liquid assets. The functioning of these companies is different

from those of NBFCs in terms of method of mobilization of deposits and requirement of deployment of depositors' funds as per Directions. Besides, Prudential Norms Directions are applicable to these companies also.

1.5.28 Ceiling on raising of deposits by RNBCs

It is true that there is no ceiling on raising of deposits by RNBCs but every RNBC has to ensure that the amounts deposited and investments made by the company are not less than the aggregate amount of liabilities to the depositors.

To secure the interest of depositor, such companies are required to invest in a portfolio comprising of highly liquid and secure instruments viz. Central/State Government securities, fixed deposits with scheduled commercial banks (SCB), Certificate of deposits of SCB/FIs, units of Mutual Funds, etc to the extent of 100 per cent of their deposit liability.

No Residuary Non-Banking Company shall forfeit any amount deposited by the depositor, or any interest, premium, bonus or other advantage accrued thereon.

1.5.29 Rate of interest payable by RNBCs on deposits and maturity period of deposits

The amount payable by way of interest, premium, bonus or other advantage, by whatever name called by a RNBC in respect of deposits received shall not be less than the amount calculated at the rate of 5% (to be compounded annually) on the amount deposited in lump sum or at monthly or longer intervals; and at the rate of 3.5% (to be compounded annually) on the amount deposited under daily deposit scheme. Further, a RNBC can accept deposits for a minimum period of 12 months and maximum period of 84 months from the date of receipt of such deposit. They cannot accept deposits repayable on demand.

1.5.30 Companies like Multi Level Marketing companies, Chit funds etc. come under the purview of RBI

No, Multi Level Marketing companies, Direct Selling Companies, Online Selling Companies don't fall under the purview of RBI. Activities of these companies fall under the regulatory/administrative domain of respective state government.

A list of such companies and their regulators are as follows:

Category of Companies	Regulator
Chit Funds	Respective State Governments
Insurance companies	IRDA
Housing Finance Companies	NHB
Venture Capital Fund /	SEBI
Merchant Banking companies	SEBI
Stock broking companies	SEBI
Nidhi Companies	Ministry of corporate affairs, Government of India

1.5.31 Unincorporated Bodies (UIBs)

Unincorporated bodies (UIBs) include an individual, a firm or an unincorporated association of individuals. In terms of provision of section 45S of RBI act, these entities are prohibited from accepting any deposit. The state government has to play a proactive role in arresting the illegal activities of such entities to protect interests of depositors/investors.

UIBs do not come under the regulatory domain of RBI. Whenever RBI receives any complaints against UIBs, it immediately forwards the same to the state government police agencies (Economic Offences Wing (EOW)). The complainants are advised to lodge the complaints directly with the state government police authorities (EOW) so that appropriate action against the culprits is taken immediately and the process is hastened.

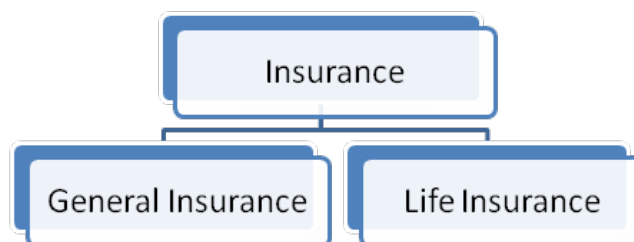


RBI on its part has taken various steps to curb activities of UIBs which includes spreading awareness through advertisements in leading newspapers to sensitize public, organize various investors awareness programmes in various districts of the country, keeps close liaison with the law enforcing agencies (Economic Offences Wing).

Companies registered with MCA but not registered with RBI as NBFCs also sometimes default in repayment of deposit/amounts invested with them

Companies registered with MCA but not registered with RBI as NBFC with RBI are not under the regulatory domain of RBI. Whenever, RBI receives any such complaints about the companies registered with MCA but not registered with RBI as NBFCs, it forwards the complaints to the ROC of the respective state for any action. The complainants are advised that the complaints relating to irregularities of such companies should be promptly lodged with Registrar of Companies (ROC) concerned for initiating corrective action.

1.6 INSURANCE



1.6.1 General Nature of Insurance Companies

The insurance industry has both economic and social purpose and relevance. It provides social security and promotes individual welfare. It reduces risk and helps to raise productivity in the economy. The actual premium of insurance companies comprises the pure premium and administrative as well as marketing cost. The pure premium is the present value of the expected cost of an insurance claim. Since (here is a lag between payment of premiums and payment of claims, there is generation of investible funds known as insurance reserves. Insurance companies may be organised as either corporations or mutual associations. A corporation is owned by its stock holders. In mutual association form, the customers are the owners, and management is formally subject to their control. There are various parts of insurance industry: life insurance, health insurance, general (property liability/property casualty) insurance, etc. While the cash flow of insurance companies is constant, their payout is deferred and contingency related. But general insurance, suffers from underwriting cycles i.e. wide swings in premiums, profitability, funds availability, etc. Generally, the insurance companies are big investors in long-gestation infrastructure development projects; they are major mobilisers of funds. But it has been found that restrictions on permitted investments have put insurance companies at a competitive disadvantage, which has led them to enter into retirement related products.

The insurance companies are financial intermediaries as they collect and invest large amounts of premiums. They offer protection to the investors, provide means for accumulating savings, and channelise funds to the government, and other sectors. They are contractual saving agencies which receive, mostly without fail, steady inflow of funds in the form of premiums or regular contributions to pension plans. They are also in a position to predict, relatively accurately, when what amounts of insurance or pension benefits have to be paid. Further, their liabilities in most cases are long-term liabilities, for many life policies are held for 30 or 40, or 50 or even more years. As a result, the liquidity is not a problem for them, and their major activity is in the field of long-term investments. Since they offer life-cover to the investors, the guaranteed rate of return specified in insurance policies is relatively low. Therefore, they do not need to seek high rates of return on their investments.

The insurance companies are active in the following fields among other—life, health, and general, and they have begun to operate the pension schemes and mutual funds also. Insurance business consists of spreading risks over time and sharing them between persons and organisations. The major part of insurance business is life insurance, the operations of which depend on the laws of mortality. The distinction between life and general insurance business is that with regard to the former, the claim is fixed and certain, but in the case of the latter, the claim is uncertain i.e., the amount of claim is variable and it is ascertainable only sometime after the event. Pension business is a specialised form of life assurance.

1.6.2 Insurance Sector Reforms

The insurance sector in India has gone through the process of reforms following these recommendations. The Insurance Regulatory & Development Authority (IRDA) Bill was passed by the Indian Parliament in December 1999. The IRDA became a statutory body in April, 2000 and has been framing regulations and registering the private sector insurance companies. The insurance sector was opened up to the private sector on August 2000. Consequently, some Indian and foreign private companies have entered the insurance business now. There are about seven general insurance and eleven life insurance companies operating in the private sector in India, early in 2004.

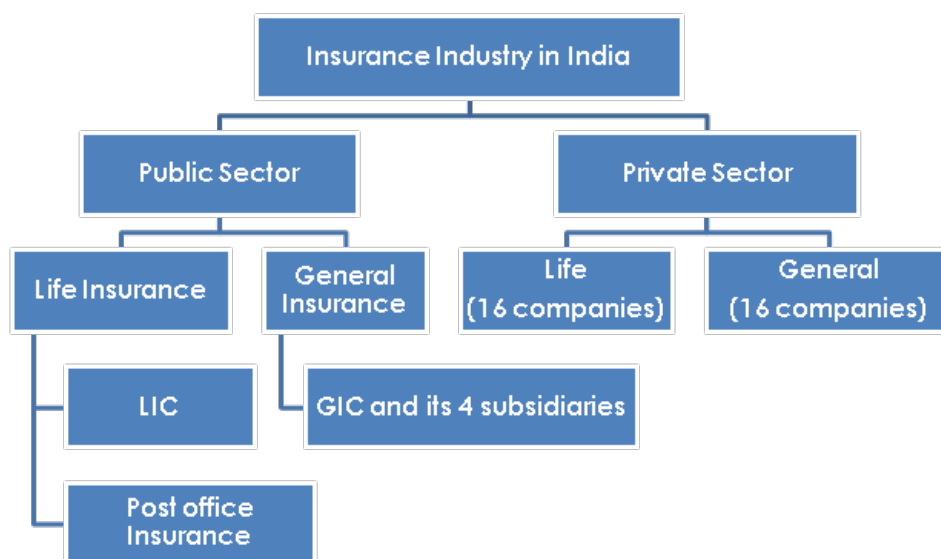


Fig: The Structure of Insurance Industry in India

1.6.3 Statutory functions of IRDA are as follows:

- ❖ Issue to the applicant a certificate of registration, renew, modify, withdraw, suspend or cancel such registration
- ❖ Protection of the interests of the policyholders in matters concerning assigning of policy, nomination by policy holders, insurable interest, settlement of insurance claim, surrender value of policy and other terms and conditions of contracts of insurance
- ❖ Specifying requisite qualifications, code of conduct and practical training for intermediaries or insurance intermediaries and agents
- ❖ Specifying the code of conduct for surveyors and loss assessors
- ❖ Promoting efficiency in the conduct of insurance business /
- ❖ Promoting and regulating professional organisations connected with insurance and reinsurance business



- ❖ Levying fees and other charges for carrying out the purposes of the Act
- ❖ Calling for information from, undertaking inspection of, conducting enquiries and investigations including audit of the insurers, intermediaries, insurance intermediaries and other organisations connected with the insurance business
- ❖ Control and regulation of rates, advantages, terms and conditions that may be offered by the insurers in respect of general insurance business not so controlled and regulated by the Tariff Advisory Committee under Section 64 U of the Insurance Act 1938 (4 of 1938)
- ❖ Specifying the form and manner in which books of accounts shall be maintained and statements of accounts shall be rendered by insurers and other insurance intermediaries
- ❖ Regulating investment of funds by insurance companies
- ❖ Regulating maintenance of margin of solvency
- ❖ Adjudication of disputes between insurers and intermediaries or insurance intermediaries
- ❖ Supervising the functioning of the Tariff Advisory Committee
- ❖ Specifying the percentage of the premium income of the insurer to finance schemes for promoting and regulating professional organisations referred to in clause (f)
- ❖ Specifying the percentage of life insurance business and general insurance business to be undertaken by the insurers in the rural and social sector
- ❖ Exercising such other powers as may be prescribed.

1.7 PENSION PLANS

Pension Funds (PNFs) have grown rapidly to become the primary vehicle of retirement benefit or retirement saving, and retirement income in many countries. A Pension Plan (PP) is an arrangement to provide income to participants in the Plan when they retire. PPs are generally sponsored by private employers, government as an employer, and labour unions. They may be Funded Pension Plans (FPPs) or Unfunded Pension Plans (UPPs). If the benefits promised by the PP are secured by assets specifically dedicated for that purpose, it is called a FPP. If the fulfillment of the promised benefits by the sponsor depends on the general credit and not by any specific contribution to be made year after year, it is called an UPP. There may also be Individual Retirement Pension Plans (IRPPs)

1.7.1 Pension Funds

In other countries, pension funds are a powerful financial intermediary. It was estimated that at the world level, pension funds controlled \$6,700 billion in 1995. In India, private pension funds still do not exist but many people have begun to stress the need for setting up such funds; and a small beginning was recently made in this respect. The setting up of the first investment-based pension fund proposed by the UTI was approved by the government in October 1994. This retirement benefit plan is meant to enable self-employed people to contribute to a pension fund so as to provide security in their old age. It is an open-ended plan in which anyone between the age of 18-52 years can contribute and receive regular monthly income from 58 years onwards. The subscriptions to the fund are expected to grow by investment in equities and debt in the ratio of 40:60. The minimum subscription is to be Rs 10,000 to be paid in not more than 20 instalments of a minimum of Rs 500 each. The withdrawal is permitted after 70 years of age, and even a premature withdrawal is allowed at a discount.

1.7.2 Classification Of Pension Plans - The financial intermediary, or an organisation, or an institution, or a trust that manages the assets and pays the benefits to the old and retirees is called a Pension Fund (PNF). Some pension plans are said to be insured i.e. in such cases, the sponsor pays premiums to a life insurance company in exchange for a group annuity that would pay retirement benefits to the participants.

Another classification of PPs is:

- (a) Defined Benefits Pension Plan (DBPP),
- (b) Defined Contribution Pension Plan (DCPP) or Money Purchase Pension Plan (MPPP),
- (c) Pay-as-you-go Pension Plan (PAYGPP)

(i) Defined Benefits Pension Plan (DBPP)

Under DBPP, the final pension is pre-defined based on the final salary and the period of service. Most of the pension plans offered by public sector enterprises and the government as employer in India are of DBPP variety. This type ensures a predictable amount of pension to the employees for all the years after their retirement and it is guaranteed by the State. DBPPs involve considerable cost to the employer. The firms with DBPP typically establish a legally separate trust fund, and the trustees invest employers' contributions in shares and bonds. "

(ii) Defined Contribution Pension Plan (DCPPs)

It is popular in US, do not guarantee the amount of final benefit which the employees would get after they retire. In DCPP, the employee and employer make a predetermined contribution each year, and these funds are invested over the period of time till the retirement of employee. Whatever the value of these investments at the time of retirement, the employee will get a certain amount which he would use to purchase an annuity. From the point of view of the employer, DCPP is also known as "money purchase pension plan".

(iii) Pay-As-You-Go-Pension Plan (PAYGPP) In most European countries, including France and Germany, pensions are paid through PAYGPP, under which the current employees pay a percentage of their income to provide for the old, and, this, along with the contribution of the State, goes as a pension that sustains the older generation. In US, there has been a trend towards a decline in DBPPs and an increase in DCPPs.

1.7.3 Management of Pension Funds Some sponsors of pension plans manage their pension funds themselves, but most of the sponsors appoint a trustee to do so on their behalf. This trustee is usually a trust department of a commercial bank, or an insurance company, or a mutual fund. The trustee-manager invests contributions provided by the sponsor and pays benefits to the retired persons. In the case of DBPPs, the assets of the PNF remain the property of the sponsor, who sets general investment policy in respect of portfolio composition, target return, quality of securities, etc. The fund manager takes day-to-day decisions on buying or selling specific assets. Some large sponsors may divide the management of their PNFs among several trustee-managers.

There are certain advantages in managing PNFs by outside trustees: (a) Transaction costs are lower. The trustee has greater expertise and he possesses all the necessary personnel, equipment, and expertise in regulatory requirements, (b) It enhances the credibility of the pension plan.

1.7.4 Pension System in India

In India, the pension system coverage is very small at present. The pension market in India is highly unorganised which covers hardly three per cent of the Indian population. The Employees' Provident Fund (EPF), Employees' Pension Scheme (EPS), and the PPF are the only schemes, which cover the pension market in India. The regular salaried employees in the organised sector have been relatively better off in that public policy provided vehicles for compulsory savings and old age provisions. It is estimated that by the year 2000, around 23 per cent of people employed in the government sector were the beneficiaries of the government's 'defined benefit pension scheme', and 49 per cent of people employed in the private sector were covered by the mandatory employee provident fund.

Last seven years, from 2000 to 2007, have seen a marked shift in pension policy in India through introduction of a new pension system. OASIS committee has recommended two major pension reforms for the government employees and the unorganised sector respectively. These efforts culminated in



setting up of the Pension Fund Regulatory and Development Authority (October 2003). Introduction of a new pension system (December 2003), and introduction of the PFRDA Bill in Parliament (March 2005).

Pension Fund Regulatory and Development Authority (PFRDA) was established by the Government of India on August 23, 2003. to promote old age income security by establishing, developing and regulating pension funds, to protect the interests of subscribers to schemes of pension funds and for matters connected therewith or incidental thereto. The authority shall consist of a Chairperson and not more than five members, of whom at least three shall be whole-time members, to be appointed by the Central Government.

The pension schemes in operation in India currently can broadly be divided into the following categories: (1) Civil Services Pension Schemes (Pay as-you-go), (2) Employees' Provident Fund (EPF), (3) Employees' Pension Scheme (EPS), (4) New Pension Scheme (NPS), (5) Voluntary Pension Schemes under which two schemes are in operation such as (i) Personal / Group Pension Plans, (ii) Public Provident Fund.

1.7.5 Current Pension Schemes

Some of the pension schemes available in India at present are:

- (i) **Government Employees' Pension Scheme:** The Government Employees' Pension Scheme (GEPS), which has been made mandatory from 1995. It is a subset of Employees' Provident Fund (EPF). It provides (a) superannuation pension, (b) retirement pension, (c) permanent total disability pension, (d) widow or widower's pension, and (e) orphan pension. It is essentially a defined-contribution and defined benefit pay-as-you-go scheme, which is financed by diverting 8.33 per cent of the employers' existing share of PF contributions.

The Central government contributes an amount equivalent to 1.16 percent of a worker's salary. The scheme provides a minimum pension of Rs 500 per month and a maximum pension of 60 per cent of the salary. All assets and liabilities of the erstwhile Family Pension Fund Scheme, 1971 have been transferred to this GEPS, 1995 scheme./After the introduction of this scheme, the employees who had enrolled in the LIC pension schemes will also obtain pension benefits from GEPS, which is also known as Employees Pension Scheme (EPS), 1995. However, only the scheme (Pension and Provident Fund Scheme for employees of establishments covered under the Employees Provident Fund Act, 1952) run by Central Provident Fund Commissioner (CPFC) is eligible for the government contribution of 1.16 per cent of salary, thereby discouraging establishments to seek exemption from running their own schemes. The employers who want to be exempted have to contribute the balance 1.16 per cent of the salary, thereby ensuring that a contribution rate of 9.5 per cent is maintained for both exempted and non-exempted schemes. All benefits from exempted schemes have to be at least equal to those provided under the EPS 1995. Employers who do not wish to contribute to centrally administered EPF can set up their own trustee managed funds and seek the same exemption from Employees' Provident Fund Organisation.

The EPF and EPS funds are invested mainly in government securities and government special deposit schemes, and individual employees do not have any say in the choice of investments. Investments of privately managed "exempted Provident Funds" are governed by guidelines which are at present as given below:

Security	Minimum % to be invested
1. Central Govt. Securities	25%
2. Govt. Securities and State Govt. Securities or guaranteed by them	15%
3. Public sector units and financial institutions bonds	30%
4. Any of the above 3 categories	30%

(ii) BEPS and IEPS

Bank Employees Pension Scheme (BEPS), 1993, and **Insurance Employees Pension Scheme (IEPS)**, 1993 are for the benefit of the employees of public sector banks, and government owned insurance companies respectively. They are financed by the entire employer's portion of the PF contribution which is 10% of the basic salary. The main benefit under these schemes (after superannuation at 60 years of age or after 33 years of service) is in the form of a pension of 50% of the average basic salary during the last 10 months of employment. An additional benefit of 50% of the average of the allowances which rank for the PF but not for DA during the last 10 months of service is also provided to the employees, and this amounts to 2-4% of the employee's salary.

(iii) Privately Administered Superannuation Fund

So far in respect of setting up and running of pension funds; they have been run by the government or semi-government organisations. If any employer sets up a privately administered superannuation fund, it is stipulated that he can accumulate funds in the form of an irrevocable trust fund during the employment period of the employee concerned, but when the pension becomes payable, suitable annuities have to be purchased from the LIC. Alternatively, the employer can have a superannuation scheme with the LIC and pay suitable contributions for the employees in service.

LIC has introduced 4 pension plans in the recent past:

- (i) Varistha Pension Bima Yojana (VPBY)
- (ii) New Jeevan Akshay (NJA)
- (iii) New Jeevan Dhara (NJD)
- (iv) New Jeevan Suraksha (NJS)

1.8 MUTUAL FUNDS

A mutual fund is a pure intermediary which performs a basic function of buying and selling securities on behalf of its unit holders, which latter also can perform but not easily, conveniently economically, and profitably. The investors in mutual fund are given the share in its total funds which is proportionate to their investments, and which is evidenced by the unit certificates.

However unlike share holders in a company, the share holders in mutual funds do not have any voting rights.

Mutual fund is the most suitable investment for the common man as it offers an opportunity to invest in a diversified, professionally managed basket of securities at a relatively low cost.

In India, a mutual fund is required to be registered with Securities and Exchange Board of India which regulates securities markets before it can collect funds from public.

Functions of Mutual Funds:

The functions are similar to those of other financial intermediaries. However, its special objective or advantage is that it provides investors of small and moderate means the opportunity that is enjoyed by large, rich investors namely, to realize high & secure rate of return on their savings.

The further details of mutual fund are discussed in the Study Note 2.

Study Note - 2

FINANCIAL MARKET INSTRUMENTS



This Study Note includes

- 2.1 Financial Market
- 2.2 Money Market
- 2.3 Money Market Instruments
- 2.4 Government Securities and Bonds
- 2.5 Repo and Reverse Repo
- 2.6 Promissory Note
- 2.7 Futures, Options and other Derivatives
- 2.8 Mutual funds

2.1 FINANCIAL MARKET

A financial market is a market where financial instruments are exchanged or traded. Financial markets provide the following three major economic functions:

1. Price discovery
 2. Liquidity
 3. Reduction of transaction costs
- 1) **Price discovery** function means that transactions between buyers and sellers of financial instruments in a financial market determine the price of the traded asset. At the same time the required return from the investment of funds is determined by the participants in a financial market. The motivation for those seeking funds (deficit units) depends on the required return that investors demand. It is these functions of financial markets that signal how the funds available from those who want to lend or invest funds will be allocated among those needing funds and raise those funds by issuing financial instruments.
- 2) **Liquidity** function provides an opportunity for investors to sell a financial instrument, since it is referred to as a measure of the ability to sell an asset at its fair market value at any time. Without liquidity, an investor would be forced to hold a financial instrument until conditions arise to sell it or the issuer is contractually obligated to pay it off. Debt instrument is liquidated when it matures, and equity instrument is until the company is either voluntarily or involuntarily liquidated. All financial markets provide some form of liquidity. However, different financial markets are characterized by the degree of liquidity.
- 3) The function of **reduction of transaction costs** is performed, when financial market participants are charged and/or bear the costs of trading a financial instrument. In market economies the economic rationale for the existence of institutions and instruments is related to transaction costs, thus the surviving institutions and instruments are those that have the lowest transaction costs.

Classification of financial markets

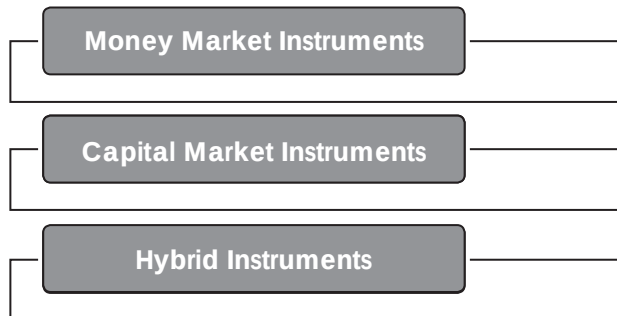
There are different ways to classify financial markets. They are classified according to the financial instruments they are trading, features of services they provide, trading procedures, key market participants, as well as the origin of the markets.

The generalized financial market classification is given in Table below:

Table: Financial market classification

Criterion	Features	Examples
Products	Tradability, transferability, ownership, maturity, denomination, substance	Equity, debt instruments, derivatives
Services	Technical, advisory, information and knowledge-based, administrative	IT support, research and analysis, custody
Ways of trading	Physical, electronic, virtual	Over the counter, exchange, internet
Participants	Professionals, non-professionals, institutions, officials	Banks, central banks, non-bank financial companies, institutional investors, business firms, households
Origin	Domestic, cross-border, regional, international	National markets, regionally integrated markets, Euromarkets, domestic/foreign currency markets, onshore/offshore markets

Types of Financial Market Instruments:



2.2 MONEY MARKET

Money market is a very important segment of the Indian financial system. It is the market for dealing in monetary assets of short-term nature. Short-term funds up to one year and for financial assets that are close substitutes for money are dealt in the money market. It is not a physical location (like the stock market), but an activity that is conducted over the telephone. Money market instruments have the characteristics of liquidity (quick conversion into money), minimum transaction cost and no loss in value. Excess funds are deployed in the money market, which in turn is availed of to meet temporary shortages of cash and other obligations.

Money market provides access to providers (financial and other institutions and individuals) and users (comprising institutions and government and individuals) of short-term funds to fulfill their borrowings and investment requirements at an efficient market-clearing price. The rates struck between borrowers and lenders represent an array of money market rates. The interbank overnight money rate is referred to as the call rate. There are also a number of other rates such as yields on treasury bills of varied maturities, commercial paper rate and rates offered on certificates of deposit. Money market performs the crucial role of providing an equilibrating mechanism to even out short-term liquidity and in the process, facilitating the conduct of monetary policy. Short-term surpluses and deficits are evened out. The money market is the major mechanism through which the Reserve Bank influences liquidity and the general level of interest rates. The Bank's interventions to influence liquidity serve as a signaling device for other segments of the financial system.

The Indian money market was segmented and highly regulated and lacked depth till the late eighties. A limited number of participants, regulation of entry and limited availability of instruments characterized

it. The instruments were limited to call (overnight) and short notice (up to 14 days) money, inter-bank deposits and loans and commercial bills. Interest rates on market instruments were regulated. Sustained efforts for developing and deepening the money market were made only after the initiation of financial sector reforms in early nineties.

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Features of Money Market:

- (a) **Instruments Traded:** Money Market is a collection of Instruments like Call Money, Notice Money, Repos, Term Money, Treasury Bills, Commercial Bills, Certificate of Deposits, Commercial Papers, Inter-Bank Participation Certificates, Inter Corporate Deposits, Swaps, etc.
- (b) **Large Participants:** The participants of Money Market are — (i) lenders, (ii) Mutual Funds, (iii) Financial Institutions including the RBI, Scheduled Commercial Banks, Discount and Finance House of India and (iv) Borrowers. Network of a large number of participants exists which add greater depth to the market. This network can be broadly classified as follows :

Organized Sector	Unorganized Sector
1. Commercial and Other Banks	1. Indigenous Bankers
2. Non-Banking Financial Companies	2. Nidhis and Chit Funds
3. Co—operative Banks	3. Unorganized Money Lenders

- (c) **Zone Centric Activities:** Activities in the money market tend to concentrate in some centre, which serves a region or an area. The width of such area may vary depending upon the size and needs of the market itself.
- (d) **Pure Competition:** Relationship between Participants in a money market is impersonal in character, and the competition is relatively pure.
- (e) **Lower Price Differentials:** Price differentials for assets of similar type tend to be eliminated by the interplay of demand and supply.
- (f) **Flexible Regulations:** Certain degree of flexibility in the regulatory framework exists and there are constant endeavours for introducing a new instruments / innovative dealing techniques.
- (g) **Market Size:** It is a wholesale market and the volume of funds or financial assets traded are very large, i.e. in crores of rupees.

Functions of the Money Market:

A money market is generally expected to perform three broad functions:

- ❖ Provide a balancing mechanism to even out the demand for and supply of short- term funds.
- ❖ Provide a focal point for central bank intervention for influencing liquidity and general level of interest rates in the economy.
- ❖ Provide reasonable access to suppliers and users of short-term funds to fulfill their borrowings and investment requirements at an efficient market clearing price.

Besides the above functions, a well-functioning money market facilitates the development of a market for longer-term securities. The interest rates for extremely short-term use of money serve as a benchmark for longer-term financial instruments.

Pre- requisites for an efficient Money Market:**1. Features of a well developed Money Market:**

- (a) Uses a broad range of financial instruments (treasury bills, bills of exchange etc).
- (b) Channelizes savings into productive investments.
- (c) Promote financial mobility in the form of inter sectoral flows of funds.
- (d) Facilitate the implementation of monetary policy by way of open market operations.

2. Pre-Requisites for an Efficient Money Market:

- (a) **Economic System:** Institutional development, relative political stability and a reasonably well developed banking and financial system.
- (b) **Integrity:** Transactions in money market are concluded over telephone followed by written confirmation from the contracting parties. Hence, integrity is a basic necessity. Thus banks and other players in the market may have to be licensed and effectively supervised by regulators.
- (c) **Short Term Funds:** The market should be able to provide an investment outlet for any temporarily surplus funds that may be available. Thus, there must be effective demand and supply of short term monies the demand for which arises from short term liquidity requirements and supply of which arises from idle cash available for temporary investment.
- (d) **Clearing Mechanism:** Efficient clearing and settlement systems. Electronic Funds Transfer (EFT), Depository System, Delivery versus Payment (DVP), High Value Inter-bank Payment System, etc. are essential pre-requisites for ensuring a risk free and transparent payment and settlement system.
- (e) **Regulation:** Government and Central Bank intervention to moderate liquidity profile.
- (f) **Apex Body:** An empowered Central Bank to ensure credibility in the system and to supervise the players in the market.
- (g) **Instruments:** The market should have varied instruments with distinctive maturity and risk profiles to serve the needs of the players in the market. Multiple instruments add strength and depth to the market.
- (h) **Integration:** Market should be integrated with the rest of the markets in the financial system to ensure perfect equilibrium. The funds should move from one segment of the market to another for exploiting arbitrage opportunities.

Differences between Capital Market and Money Market:

Aspect	Capital Market	Money Market
Type of Instruments	Debt and Equity Instruments.	Debt Instruments only.
Tenor of Instruments	Medium and Long Term Instruments.	Short Term usually less than one year.
Examples	Equity Shares, Preference Stock, Debenture Stock, Zero Coupon Bonds, etc.	Treasury Bills, Certificates of Deposits, Commercial Papers, Banker's Acceptance.
Classification	Capital Market is further classified into Primary Market and Secondary Market.	There is no such further classification.
Participants	Retail Investors, Institutional Investors (Mutual Funds), Financial Institutions, etc.	Banks, Financial Institutions, Reserve Bank of India, Government.
Risk	Low credit and market risk involved.	High credit and market risk.
Regulator	SEBI	RBI

Benefits of an efficient Money Market:

- ❖ Provides a stable source of funds to banks
- ❖ Encourages development of non-bank entities
- ❖ Facilitates government market borrowing
- ❖ Makes effective monetary policy actions
- ❖ Helps in pricing different floating interest products

Role of the Reserve Bank of India in the Money Market:

The Reserve Bank of India is the most important constituent of the money market. The market comes within the direct purview of the Reserve Bank regulations.

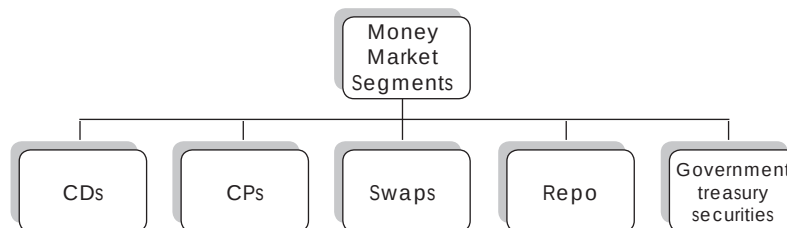
The aims of the Reserve Bank's operations in the money market are:

- ❖ To ensure that liquidity and short-term interest rates are maintained at levels consistent with the monetary policy objectives of maintaining price stability;
- ❖ To ensure an adequate flow of credit to the productive sectors of the economy; and
- ❖ To bring about order in the foreign exchange market.

The Reserve Bank influences liquidity and interest rates through a number of operating instruments- cash reserve requirement (CRR) of banks, conduct of open market operations (OMOs), repos, change in bank rates, and, at times, foreign exchange swap operations.

Money Market Segments:

In a broad sense, money market consists of the market for short-term funds, usually with maturity up to one year. It can be divided into several major segments:



2.3 MONEY MARKET INSTRUMENTS

- A. Call/notice money market
- B. Treasury bill (T-bills)
- C. Commercial Bills (CBs)
- D. Commercial Papers (CPs)
- E. Certificates of Deposits (CDs)
- F. Collateralised Borrowing and Lending Obligation

Call/notice money market and treasury bills form the most important segments of the Indian money market. Treasury bills, call money market, and certificates of deposit provide liquidity for government and banks while commercial paper and commercial bills provide liquidity for the commercial sector and intermediaries.

Major characteristics of money market instruments are:

- Short-term nature;
- Low risk;
- High liquidity (in general);
- Close to money.

The various instruments are now detailed as under:

A. Call/Notice money:

Call/Notice money is an amount borrowed or lent on demand for a very short period. If the period is more than one day and upto 14 days, it is called notice money and if the period more than 14 days, it is called call money.

Exclusions: Intervening holidays and / or Sundays are excluded for this purpose.

No collateral security is required to cover these transactions.

Participants of Call money:

Nature of Persons	Persons
Borrow and Lend	Reserve Bank of India (RBI) through LAFs, Banks, Primary Dealers (PD)
Lenders	Financial Institutions such as:-
	(a) Life Insurance Corporation of India (LIC)
	(b) Unit Trust of India (UTI) and Mutual Funds
	(c) General Insurance Corporation (GIC)
	(d) Industrial Development Bank of India (IDBI)
	(e) National Bank for Agricultural and Rural Development (NABARD)
	(f) Industrial Credit Investment Corporation of India (ICICI)

Benefits:

- (a) Banks and Institutions:** Call Market enables Banks and Financial Institutions to even out their day-to-day deficits and surpluses of money.
- (b) Cash Reserve Requirements:** Commercial Banks, Co-operative Banks and Primary Dealers are allowed to borrow and lend in this market for adjusting their cash reserve requirements.
- (c) Outlet for Deploying Funds:** It serves as an outlet for deploying funds on short-term basis to the lenders having steady inflow of funds.

Other Features:

(a) Restriction on Participation:

- ❖ Specified All-India Financial Institutions, Mutual Funds and certain specified entities are allowed to access Call/Notice money only as Lenders.
- ❖ Call money is an inter-bank market, hence non-bank entities are not allowed access to this market.

(b) Interest Rates: Interest rates in the call and notice money market are market determined.

(c) Account with RBI: In view of the short tenure of such transactions, both the Borrowers and the Lenders are required to have current accounts with the Reserve Bank of India.



Purposes: Banks borrow in this money market for the following purpose—

- (a) To fill the gaps or temporary mismatches in funds.
- (b) To meet the Cash Reserve Ratio (CRR) and Statutory Liquidity Ratio (SLR) mandatory requirements as stipulated by RBI.
- (c) To meet sudden demand for funds arising out of large outflows.

Nature of Call money market:

Call money represents the amount borrowed by the commercial banks from each other to meet their temporary funds requirements. The market for such extremely short period loans is referred to as the "call money market".

Call loans in India are given:

- (i) to the bill market,
- (ii) to dealers in stock exchange for the purpose of dealings in stock exchange,
- (iii) between banks, and
- (iv) to individuals of high financial status in Mumbai for ordinary trade purpose in order to save interest on cash credit and overdrafts.

Among these uses, inter-bank use has been the most significant. These loans are given for a very short duration, between 1 day to 15 days. There are no collateral securities demanded against these loans i.e., unsecured. The borrower has to repay the loans immediately they are called for i.e., highly liquid. As such, these loans are described as "call loans" or "call money".

Until March 1978, transactions in the call money market were usually effected through brokers. From March 1978, the RBI has prohibited banks paying brokerage on operations in the call money market.

Call market is over-the –telephone-market. In Mumbai, call market starts business at 10 a.m. and close by 2.30 p.m. Borrowers and lenders contact each other over telephone.

Interest rate & maturity of call loans can be renewed with the consent of borrowers and lenders.

It is well known that money and credit situation in India every year is subject to seasonal fluctuations. Transactions in call money market are influenced by this factor. The seasonal ups and downs get reflected in volumes of money at call or short notice, increasing during busy season and declining in slack season. The demand for call money borrowings is the highest around March every year due to meet tax payments, to meet statutory obligations by financial institutions and to maintain higher CRR.

Location: Call money markets are mainly located in big industrial and commercial centres like Mumbai, Calcutta, Chennai, Delhi, Ahmedabad. Among these Mumbai and Calcutta are more important from the point of view of the size.

Size: Total call loans in India was ₹9.3 crores in 1955-56, but it is increased to ₹7,147 crores in 1995-96 and to ₹36,093 crores in 2002-03. This market is developed from 14/6/2003 by reducing the lending limit of non-bank participants to 75% of their average daily call money. From 27/12/2003 the lending limit of non-bank is further reduced to 60%. From 7/2/2004, primary dealers are allowed to borrow upto 200% of their owned funds. On an average the volume of turnover in call market was ₹6,000 crore during 1991-97. But it has increased to ₹1,00,000 crore in October 2003.

Call money market -An edge for Commercial Banks

Call loans are preferable to Commercial Banks because:

- (i) It is available from other banks in order to meet a sudden demand for funds, large payments, large remittance and to maintain cash reserve ratio (CRR) with the RBI.

- (ii) These loans are given for a very short duration, between 1 day to 15 days. Banks can easily and quickly borrow from call market to meet their needs.
- (iii) There are no collateral securities demanded against these loans i.e., unsecured. The RBI had recommended that the call market should be reserved for commercial banks without any ceiling on call rates.
- (iv) Banks can invest their temporary surplus fund in call market of high call rate to earn maximum profit without hampering liquidity.

Volatile nature of Call money rate

The rate of interest paid on call loans is known as the call rate. The call rate is highly variable with changes in demand for and supply of call loans. It varies from day to day, from hour to hour and from centre to centre. Average monthly call rates are higher in March, April, May, October & November. Average monthly call rates are lower in January, August, and December because demand for liquid fund is lower in that time. Till 1973, the call rate in India has been determined by market forces. On account of credit policy of RBI in 1973, the call rate had reached at 39%. As this rate had very high for short term loan, in 1973 the Indian Bank Association (IBA) fixed a ceiling of 15% on call rate. Since then, the IBA lowered this ceiling to 12.5% in 1976 and 10% in April 1980. From May 1989 the ceiling on call rate were withdrawn and it has been freely determined by the market forces. During November 1999 to February 2000 call rate varies from 5% to 8%. In March 2000 it goes to 25% and on 27-4-2000 it falls to 7%. In October 2002 call rate comes down to 5.74%. The call rate is the highest in Calcutta and the lowest in Mumbai. Call rate in Calcutta is higher because demand for funds in terms of trading in commodities like Jute, Tea, Coal is higher. The supply of fund is lower in Calcutta because bankers and organized money markets are very weak.

Factors affecting fluctuation of call rate:

After the removal of ceiling, the call rate has fluctuated widely. The call rate is volatile due to following reasons:

- (a) Large borrowings on certain dates by banks to meet the CRR requirements (then call rate rise sharply) and demand for call money falls when CRR needs are met.
- (b) The credit operations of certain banks tend to be much in excess of their own resources.
- (c) Disturbance in the banking industry.
- (d) When liquid fund of an institution is very essential to repay the loan, advance tax, matured amount of security, and at the boom position of institution the call rates increase.
- (e) When call market is easy, Banks invest funds in govt. securities, bonds in order to maximise earnings. But with no buyers in the market, these securities are not cashed. Due to such liquidity crisis, call rate is high.
- (f) The structural deficiencies in the banking system. The banking system tries to build up deposits in last week of end of the year.
- (g) Forex market turbulence.
- (h) Call market is over-the-telephone-market. Borrowers and lenders contact each other over telephone. In the absence of perfect communication they deal at different rates.
- (i) In call market, main borrowers are commercial banks and lenders are UTI, LIC etc. In absence of lenders for few days, call rates rise up.
- (j) When Govt. securities mature and are encashed by the public, supply of call loans increases and call rates fall.
- (k) Cyclical mass import payments reduces liquidity in the money market and hence call rates decreases.



Measures adopted from time to time for stabilizing call rates:

The volatility of call rate can be controlled to achieve a state of stability by the following ways:

- (i) Intervention by the DFHI as market maker.
- (ii) Channelization of more funds by the RBI through the DFHI, & STCI.
- (iii) Channelization of more funds by certain financial institutions with surplus funds.
- (iv) Introduction of new money market instruments and allowing large number of participants in call money market.
- (v) Use of call loans for normal banking operation.

For this purpose, the RBI has been established different policy. The money market support by RBI and the reduction in CRR for credit expansion & for increase liquidity, and increasing Govt. securities refinancing had helped to moderate the call rate in 1995. The spot foreign exchange purchases by the RBI had helped to reduce the call rate in March 1996. The recommencement of repo auctions by RBI in November 1996 had provided a reasonable floor to call money rates.

It cannot be said that these measures have reduced the volatility in the call market in India.

Inter – Bank Money and its distinction from Call Money and Notice Money:

Inter Bank Market for deposits of maturity beyond 14 days is referred to as Inter-Bank Term Money. Term Money is accepted by the institutions at a discounted value, and on the due date payment will be made equal to the face value.

Participants: Financial Institutions permitted by RBI such as IFCI, SIDBI, NABARD, EXIM Bank, DFHI (Discount & Finance House of India), etc.

Tenor of Instrument: 3 Months to 6 Months.

Rate of Interest: Negotiated between the Participants.

Other Feature: Investment in Term Money is unsecured and the limits are fixed by RBI.

Reasons for Development of Term Money Market:

- (a) Declining spread in lending operations
- (b) Volatility in the call money market with accompanying risks in running mismatches.
- (c) Growing desire for fixed interest rate borrowing by corporates.
- (d) Fuller integration between forex and money markets.

Inter Bank Participation Certificate:

Inter Bank Participation Certificates (IBPC) are short-term instruments to even out the short term liquidity within the Banking system particularly when there are imbalances affecting the maturity mix of assets in Banking Book.

Objective: To provide a degree of flexibility in the credit-portfolio of Banks. It can be issued by Scheduled Commercial Bank and can be subscribed by any Commercial Bank.

Types: There are two types of participation certificates-

Aspect	Without Risk to Lender	With Risk to Lender
Period	Period not exceeding 90 Days	91 Days to 180 Days
Disclosure	Issuing Bank: Disclose as Liability under Borrowing from Banks. participating Bank: Advances to Bank	Issuing Bank: Reduce from Advances Outstanding. Participating Bank: Under Advances

Other Features:

- (a) Interest rate on IBPC is freely determined in the market, i.e. negotiable.
- (b) Certificates are neither transferable nor prematurely redeemable by the Issuing Bank.
- (c) Issuing Bank can secure funds against advances without actually diluting its asset-mix.

Inter Corporate Deposits & Public Deposits:

1 Inter Corporate Deposits: (ICD's)

- (a) Companies can borrow funds for a short period, for example 6 months or less, from other companies which have surplus liquidity.
- (b) Such deposits made by one Company in another are called Inter-Corporate Deposits (ICD's) and are subject to the provisions of the Companies Act, 1956.
- (c) The rate of interest on ICD's varies depending upon the amount involved and time period.
- (d) RBI permits Primary Dealers to accept Inter Corporate Deposits up to fifty per cent of their Net Worth and that also for a period of not less than 7 days. Primary Dealers cannot lend in the Inter Corporate Deposits market.
- (e) The risk on ICDs is very high.

2 Public Deposits:

- (a) Public Deposits are a very important source for short-term and medium term finance.
- (b) A Company can accept public deposits from members of the public and shareholders, subject to the stipulations laid down by RBI from time to time.
- (c) The maximum amount that can be raised by way of Public Deposits, maturity period, procedural compliance, etc. are laid down by RBI, from time to time.
- (d) These deposits are unsecured loans and are used for working capital requirements. They should not be used for acquiring fixed assets since they are to be repaid within a period of 3 years.

B. Treasury Bills:

Treasury bills are short-term instruments issued by the Reserve Bank on behalf of the government to tide over short-term liquidity shortfalls. This instrument is used by the government to raise short-term funds to bridge seasonal or temporary gaps between its receipts (revenue and capital) and expenditure. They form the most important segment of the money market not only in India but all over the world as well.

T-bills are repaid at par on maturity. The difference between the amount paid by the tenderer at the time of purchase (which is less than the face value) and the amount received on maturity represents the interest amount on T-bills and is known as the discount. Tax deducted at source (TDS) is not applicable on T-bills.

Features of T-bills:

- ❖ They are negotiable securities.
- ❖ They are highly liquid as they are of shorter tenure and there is a possibility of inter-bank repos in them.
- ❖ There is an absence of default risk.
- ❖ They have an assured yield, low transaction cost, and are eligible for inclusion in the securities for SLR purposes.
- ❖ They are not issued in scrip form. The purchases and sales are effected through the Subsidiary General Ledger (SGL) account.

- ❖ At present, there are 91-day, 182-day, and 364-day T-bills in vogue. The 91-day T-bills are auctioned by the RBI every Friday and the 364-day T-bills every alternate Wednesday, i.e., the Wednesday preceding the reporting Friday.
- ❖ Treasury bills are available for a minimum amount of ₹25,000 and in multiples thereof.

Issue Price: Treasury Bills are issued at a discount and redeemed at face value.

Auction Method: 91 days T-Bills are auctioned under uniform price auction method whereas 364 days T-Bills are auctioned on the basis of multiple price auction method.

Investors: Banks, Primary Dealers, State Governments, Provident Funds, Financial Institutions, Insurance Companies, NBFCs, FIs (as per prescribed norms), NRIs & OCBs can invest in T-Bills.

Yield in T-Bill:
$$\text{Yield} = \frac{F - P}{P} \times \frac{365}{M} \times 100$$

Where, F = Face Value of T-Bill

P = Purchase Price or Issue Price

M = Maturity Period

Types of Treasury Bills available in the Money market:

There are three categories of T-bills:



On-tap Bills:

On-tap Bills, as the name suggests, could be bought from the Reserve Bank at any time at an interest yield of 4.66 per cent. They were discontinued from April 1, 1997, as they had lost much of their relevance.

Ad hoc Bills:

Ad hoc Bills were introduced in 1955. It was decided between the Reserve bank and the Govt. of India that the government could maintain with the Reserve Bank a cash balance of not less than ₹50 crore on Fridays and ₹4 crore on other days, free of obligation to pay interest thereon, and whenever the balance fell below the minimum, the govt. account would be replenished by the creation of ad hoc bills in favour of the Reserve Bank. Ad hoc 91-day T-bills were created to replenish the government's cash balances with the Reserve Bank. But, they were discontinued from April 1, 1997.

Auctioned T-bills:

Auctioned T-bills, the most active money market instrument, were first introduced in April 1992. The Reserve Bank receives bids in an auction from various participants and issues the bills subject to some cut-off limits. Thus, the yield of this instrument is market determined. These bills are neither rated nor can they be rediscounted with the Reserve Bank. At present, the Reserve Bank issues T-bills of three maturities: 91-days, 182-days, and 364-days.

14 Day T-bills:

With the 91-day tap T-bills being discontinued, a scheme for the sale of 14-day intermediate T-bills was introduced effective from April 1, 1997 and 14-day auction T-bills was introduced from May 20, 1997 to facilitate the cash management requirements of various segments of the economy and emergence of a more comprehensive yield curve.

These represent Government's contribution to the money market. They are intended to Mop-up short-term funds in the money market, and hence act as an important tool in monetary policies. The Treasury Bills are generally sold through auctions, the discount rate determined by the market.

Features Advantages	Advantages
1. Sold for a minimum amount of ₹1,00,000 and in multiples of ₹1,00,000.	1. Manage cash position with minimum balances.
2. Issued only in book entry form.	2. Increased liquidity.
3. Not transferable.	3. Minimal risk of Capital Loss.
4. Re-discounted at 50 basis points higher than the discount rate and on re-discounting are extinguished.	4. Market related yield.
	5. Eligible for repo transactions.
	6. Classifiable as SLR security.

91 Day T-bills: These are again two types- ordinary and ad-hoc. Ordinary treasury bills are issued to public and RBI for enabling central government to meet temporary requirements of funds. Treasury bills were used to be sold to public at a fixed rate throughout the week to commercial banks and the public. They are repaid at par on maturity. The difference between the amount paid by the tenderer at the time of purchase and the amount received on maturity represents the interest earned and also known by discount.

182 Day T-bills: These bill were reintroduced in 1999 to enable the development a market for government securities .The Reserve Bank of India introduced 182 days Treasury Bills, as an active money market instrument with flexible interest rates. Its features include:

- (a) These Treasury Bills are issued following the procedure of auction.
- (b) 182 Days Treasury Bills are issued in minimum denomination of ₹1 lakh and in multiples thereof. However, in the secondary market, the deals are presently transacted for a minimum amount of ₹25 lakhs and thereafter in multiples of ₹10 lakhs.
- (c) RBI does not purchase 182 Days Treasury Bills before maturity but the investors (holders of these Treasury Bills) can sell them in the secondary market.
- (d) These bills are also eligible for Repo Transactions.

364 Day T-bills: In April 1992, the 364-day T-bills were introduced to replace the 182-day T-bills. These T-bills are issued to generate market loans. The auction of these bills is done fortnightly, as their issue has become a regular activity by the Central Government. These bills offer short-term investment offer for investors and created good response. RBI offers these bills periodically and auctions by giving an opportunity to Banks and other financial institutions. The Government of India has now floated Treasury bills of varying maturities upto 364 days on an auction basis which are identical to that for the 182 days treasury bills. They contain varying period of maturities help the short term investors to decide on the period of investment of their funds.

Treasury bill market in India:

The market that deals in treasury bills is the treasury bill market. These bills are short-term (91 days) liability of the Government of India. Treasury bills are claims against the central government and so they do not require any grading or further endorsement or acceptance.

The important qualities of treasury bills are : the high liquidity, absence of risk of default, ready availability, assured yield, low transactions costs, eligibility for inclusion in statutory liquidity ratio and negligible capital depreciation.



Treasury bills are of two kinds: adhoc and ordinary.

Adhoc means for the particular end. Thus, adhoc treasury bills are issued for providing investment funds to the State Government, semi government departments. The ordinary treasury bills are sold to the public or banks which are freely marketable.

Treasury bills are bought and sold on discounted basis. This price is lower than its face value by the amount of interest due on the bill. When the RBI buys back bills, it is said to rediscount them i.e., discount them all over again for their remaining maturity period.

India has experimented with 91-day treasury bills. In November 1986 the Government of India introduced a new 182 day treasury bills. The 182-day treasury bill is eligible for borrowing Standby refinance facility. In April 1992 364-day treasury bill is introduced.

The treasury bill market in India is highly undeveloped. The RBI is the sole dealer in them. There are no dealers outside the RBI who may be willing to buy and sell of such bills, because treasury bill discount rate in India had been kept at very low level of 4.6% p.a. Regarding the size of the treasury bill market outstanding amount at the end of each year may be highlighted. The amount increased from ₹2,518 crore in 1970-71 to ₹56,517 crore in 1996-97. The size of the treasury bill market has been narrow for different reasons. First, RBI freely rediscounts treasury bills. As a result banks take this opportunity frequently. Secondly, the difference between treasury bill rate and deposit rates has been wide enough to discourage people from investing in treasury bills. Thirdly, RBI policy of requiring banks to invest in treasury bills to fulfill SLR obligation and stable condition in the government securities market make treasury bills an unattractive investment.

Many observers think that treasury bills being short term instruments should be used to meet only the temporary needs of the government. They should not be used as a cheap source of long-term funds and RBI should not extend help in this regard.

C. Commercial Bills

The working capital requirement of business firms is provided by banks through cash-credits / overdraft and purchase/discounting of commercial bills.

Commercial bill is a short term, negotiable, and self-liquidating instrument with low risk. It enhances the liability to make payment in a fixed date when goods are bought on credit. The bill of exchange is a written unconditional order signed by the drawer requiring the party to whom it is addressed to pay on demand or at a future time, a definite sum of money to the payee. It is negotiable and self-liquidating money market instrument which evidences the liquidity to make a payment on a fixed date when goods are bought on credit. It is an asset with a high degree of liquidity and a low degree of risk. Such bills of exchange are discounted by the commercial banks to lend credit to the bill holder or to borrow from the Central bank. The bank pays an amount equal to face value of the bill minus collection charges and interest on the amount for the remaining maturity period. The writer of the bill (debtor) is drawer, who accept the bill is drawee and who gets the amount of bill is payee.

Types of Commercial Bills:

Commercial bills can be inland bills or foreign bills.

Inland bills must:

- (1) be drawn or made in India and must be payable in India: or
- (2) drawn upon any person resident in India.

Foreign bills, on the other hand, are:

- (1) drawn outside India and may be payable and by a party outside India, or may be payable in India or drawn on a party in India or

- (2) it may be drawn in India and made payable outside India. A related classification of bills is export bills and import bills. While export bills are drawn by exporters in any country outside India, import bills are drawn on importers in India by exporters abroad.

Purpose:

Commercial Bills may be used for financing the movement and storage of goods between countries, before export (pre-export credit), and also within the country. In India, the use of bill of exchange appears to be in vogue for financing agricultural operations, cottage and small scale industries, and other commercial and trade transactions.

The indigenous variety of bill of exchange for financing the movement of agricultural produce, called a 'hundi' has a long tradition of use in India. It is vogue among indigenous bankers for raising money or remitting funds or to finance inland trade. A hundi is an important instrument in India; so indigenous bankers dominate the bill market. However, with reforms in the financial system and lack of availability of funds from private sources, the role of indigenous bankers is declining.

Reasons for under-developed market in India:

The bills are a very important device for providing short-term finance to trade and industry. But bill market in India is under developed. Market for bills is limited, because:

- (i) The practice of borrowing against commercial bills is not well-established. Only exception is the market created by the RBI for accommodation. The share of bill finance in the total bank credit is quite small. It has varied 8% to 22% during 1950-51 to 1995-96.
- (ii) The supply of bills is neither continuous nor substantial. In fact borrowing against bills, purchasing on credit is not a common practice in India. The culture of depending on bills is yet to develop.
- (iii) Commercial banks do not make much use of bills of exchange while granting loans.
- (iv) Lack of uniformity throughout the country and high stamp duty are also responsible.
- (v) In India, the cash credits and overdrafts are cheaper & safer than bill financing.
- (vi) In India, the number of branches of commercial banks has increased tremendously. This development must have facilitated the direct discounting & collection of bills by branches of banks and it slow down the development of the bill market.
- (vii) Bill markets were mostly established for the purpose of financing foreign trade. But in India, the volume of foreign trade has remained very small.
- (viii) The absence of specialized credit information agencies.

Initiative to develop bill market:

With a view to eliminating movement of papers and facilitating multiple rediscounting, RBI introduced an innovation instruments known as 'Derivative Usance Promissory Notes,' backed by such eligible commercial bills for required amounts and usance period (up to 90 days). Government has exempted stamp duty on derivative usance promissory notes. This has simplified and streamlined bill rediscounting by institutions and made the commercial bill an active instrument in the secondary money market. This instrument, being a negotiable instrument issued by banks, is a sound investment for rediscounting institutions. Moreover rediscounting institutions can further discount the bills anytime prior to the date of maturity. Since some banks were using the facility of rediscounting commercial bills and derivative usance promissory notes of as short a period as one day, the Reserve Bank restricted such rediscounting to a minimum period of 15 days. The eligibility criteria prescribed by the Reserve Bank for rediscounting commercial bills are that the bill should arise out of a genuine commercial transaction showing evidence of sale of goods and the maturity date of the bill should to exceed 90 days from the date of rediscounting.



So far, the RBI has introduced two bill market schemes – one in 1952 another in 1970, to develop the bill market. According to scheme of 1952, advances were granted to scheduled banks by way of demand loans on the security of 'usance bills.' The 1952 scheme aimed at encouraging commercial banks accept more bills. It did not try to promote creation of bills as such. Naturally the scheme did not make much of an impact.

RBI introduced the new bill in November 1970 with the object of promoting a genuine bill market in India. According to scheme of 1970, all commercial banks are eligible for offering bills of exchange to the RBI for rediscount. It has been modified from time to time. Its main features are: (a) The bills covered under the scheme must be genuine trade bills – with evidence of sale or dispatch of goods. (b) The RBI rediscounts these bills. So it is often called 'Bills Rediscounting Scheme'. (c) All commercial banks will be eligible to offer bill of exchange. (d) The bill should bear at least two good signatures, one of which scheduled bank. From May, 1990, more than 25 institutions (Like LIC, GIC, UTI, ICICI etc) have been permitted to rediscount commercial bills. DFHI was set up to develop money market including the market for commercial bills. Remission of stamp duty on bills of exchange was also permitted by the government.

Important changes have taken place in the structure of bill finance. From around 1991-1992, the supply of foreign bills has exceeded that of inland bills and the amount of bills discounted has exceeded that of bills purchased in respect of inland bills.

D. Commercial Paper

Commercial paper (CP) is an unsecured short-term promissory note, negotiable and transferable by endorsement and delivery with a fixed maturity period. It is issued only by large, well known, creditworthy companies and is typically unsecured, issued at a discount on face value, and redeemable at its face value. The aim of its issuance is to provide liquidity or finance company's investments, e.g. in inventory and accounts receivable.

The major issuers of commercial papers are financial institutions, such as finance companies, bank holding companies, insurance companies. Financial companies tend to use CPs as a regular source of finance. Non-financial companies tend to issue CPs on an irregular basis to meet special financing needs.

Commercial paper was introduced in 1990 to enable highly rated investors to diversify their sources, of their short-term borrowings and also to produce an additional instrument in the market. Guidelines issued by RBI are applicable to issuers if CP like Non-banking finance companies and non-financial companies. Primary dealers are also permitted to issue commercial paper. CP should be issued for a minimum period of 7 days to a maximum period of one year. No grace period is allowed for payment and if the maturity date falls on a holiday it should be paid on the previous working day. Commercial paper can be permitted to be issued by the companies whose net worth is not less than ₹5 crore. And fund based working capital limits are not less than ₹4 crore. It must be a listed company on a stock exchange and should have given credit rating by CRISIL.

The difference between the initial investment and the maturity value, constitutes the income of the investor.

e.g. A Company issues a Commercial Paper each having maturity value of ₹5,00,000. The Investor pays (say) ₹4,82,850 at the time of his investment. On maturity, the Company pays ₹5,00,000 (maturity value or redemption value) to the Investor. The Commercial Paper is said to be issued at a discount of ₹5,00,000 - ₹4,82,850 = ₹17,150. This constitutes the interest income of the investor.

Commercial Paper- Salient Features

- ❖ CPs are issued by companies in the form of usance promissory note, redeemable at par to the holder on maturity.
- ❖ The tangible net worth of the issuing company should be not less than ₹4 crores.
- ❖ Working capital (fund based) limit of the company should not be less than ₹4 crores.

- ❖ Credit rating should be at least equivalent of P-2 of CRISIL/P2/PP2/D2 or higher from any approved rating agencies and should be more than 2 months old on the date of issue of CP.
- ❖ Corporates are allowed to issue CP up to 100% of their fund based working capital limits.
- ❖ It is issued at a discount to face value.
- ❖ CP attracts stamp duty.
- ❖ CP can be issued for maturities between 15 days and less than one year from the date of issue.
- ❖ CP may be issued in the multiples of ₹5 lakh.
- ❖ No prior approval of RBI is needed to issue CP and underwriting the issue is not mandatory.
- ❖ All expenses (such as dealers' fees, rating agency fee and charges for provision of stand-by facilities) for issue of CP are to be borne by the issuing company.

Commercial Paper- Advantages

- 1) **Simplicity:** Documentation involved in issue of Commercial Paper is simple and minimum.
- 2) **Cash Flow Management:** The Issuer Company can issue Commercial Paper with suitable maturity periods (not exceeding one year), tailored to match the cash flows of the Company.
- 3) **Alternative for bank finance:** A well-rated Company can diversify its sources of finance from Banks, to short-term money markets, at relatively cheaper cost.
- 4) **Returns to Investors:** CP's provide investors with higher returns than the banking system.
- 5) **Incentive for financial strength:** Companies which raise funds through CP become well-known in the financial world for their strengths. They are placed in a more favourable position for raising long-term capital also. So, there is an inbuilt incentive for Companies to remain financially strong.

RBI Guidelines in respect of issue of "Commercial Paper"

- 1) **Eligible issuers of CP:** (a) Corporates, (b) Primary Dealers (PDs), and (c) All-India Financial Institutions (FIs) that have been permitted to raise short-term resources under the umbrella limit fixed by RBI are eligible to issue CP.
 - ❖ **All-India Financial Institutions (FIs)** mean those financial institutions which have been permitted specifically by the RBI to raise resources by way of Term Money, Term Deposits, Certificates of Deposit, Commercial Paper and Inter-Corporate Deposits, where applicable, within umbrella limit.
 - ❖ **Primary Dealer** means a non-banking financial company which holds a valid letter of authorization as a Primary Dealer issued by the RBI.
- 2) **Investors for CP:** CP may be issued to and held by —
 - (a) Individuals
 - (b) Banking Companies
 - (c) Other Corporate Bodies registered/ incorporated in India
 - (d) Unincorporated Bodies
 - (e) Non-Resident Indians (NRIs) and
 - (f) Foreign Institutional Investors (FIIs)
- 3) **Maturity:** CP can be issued for maturities between a minimum of 7 days and a maximum up to one year from the date of issue. Maturity date of CP should not go beyond the date up to which the credit rating of the issuer is valid.



- 4) **Denominations:** CP can be issued in denominations of ₹5 lakh or multiples thereof. Amount invested by a single investor should not be less than ₹5 lakh (face value).
- 5) **Basic issue conditions for a Corporate:** A Corporate would be eligible to issue CP provided –
- (a) Its tangible Net Worth, as per the latest audited Balance Sheet, is not less than ₹4 Crores,
 - (b) It has been sanctioned working capital limit by bank/s or all-India financial institution/s,
 - (c) Its borrowal account is classified as a Standard Asset by the financing bank(s)/ institution(s).
- 6) **Credit Rating:** All eligible participants shall obtain the credit rating for issuance of CP from –
- (a) Credit Rating Information Services of India Ltd. (CRISIL) or
 - (b) Investment Information and Credit Rating Agency of India Ltd. (ICRA) or
 - (c) Credit Analysis and Research Ltd. (CARE) or
 - (d) FITCH Ratings India Pvt. Ltd. or
 - (e) Such other credit rating agencies as may be specified by the RBI.
- Minimum credit rating shall be P-2 of CRISIL or such equivalent rating by other agencies. At the time of issuance of CP, the rating so obtained should be current and not fallen due for review.
- 7) **Amount of CP**
- (a) The aggregate amount of CP from an issuer shall be the least of—
 - ❖ limit as approved by its Board of Directors, or
 - ❖ quantum indicated by the Credit Rating Agency for the specified rating.
 - (b) An FI can issue CP within the overall umbrella limit fixed by the RBI, i.e. issue of CP together with Term Money Borrowings (TMB), Term Deposits (TD), Certificates of Deposit (CD) and Inter-Corporate Deposits (ICD) should not exceed 100% of its Net Owned Funds, as per the latest audited Balance Sheet.
- 8) **Time Period:** The total amount of CP proposed to be issued should be raised within two weeks from the date on which the issue is open for subscription. Every CP issue shall be reported to the RBI, through the Issuing and Paying Agent (IPA) within three days from the date of completion of the issue.
- 9) **Mode of Issuance:** The following points are relevant –
- a) CP can be issued either in the form of a promissory note (physical form) or in a dematerialized form (demat form) through any of the depositories approved by and registered with SEBI.
 - b) CP will be issued at a discount to face value as may be determined by the issuer.
 - c) No issuer shall have the issue of CP underwritten or co-accepted.
- 10) **Issuing and Paying Agent (IPA):** Only a Scheduled Bank can act as an IPA for issuance of CP. Every issuer must appoint an IPA for issuance of CP.
- 11) **Procedure for Issuance:** Issuer should disclose its financial position to the potential investors. After the exchange of deal confirmation, issuing Company shall issue physical certificates to the investor or arrange for crediting the CP to the investor's account with a depository. Investors shall be given a copy of IPA certificate to the effect that the issuer has a valid agreement with the IPA and documents are in order.
- 12) **Mode of Investment in CP:** The investor in CP shall pay the discounted value (issue price) of the CP by means of a crossed account payee cheque to the account of the issuer through IPA.

- 13) Repayment of CP on maturity:** On maturity of CP, when the CP is held in physical form, the holder of the CP shall present the instrument for payment to the issuer through the IPA. When the CP is held in demat form, the holder of the CP will get it redeemed through the depository and receive payment from the IPA.
- 14) Defaults in CP market:** In order to monitor defaults in redemption of CP, Scheduled Banks which act as IPAs, shall immediately report, on occurrence, full particulars of defaults in repayment of CPs to the RBI.
- 15) Stand-by Facility:** Non-bank entities including corporates may provide unconditional and irrevocable guarantee for credit enhancement for CP issue provided –
 - a) the issuer fulfils the eligibility criteria prescribed for issuance of CP,
 - b) the guarantor has a credit rating at least one notch higher than the issuer given by an approved credit rating agency, and
 - c) the offer document for CP properly discloses the net worth of the guarantor Company, the names of the Companies to which the guarantor has issued similar guarantees, the extent of the guarantees offered by the guarantor Company, and the conditions under which the guarantee will be invoked.

E. Certificate of Deposits

Certificates of Deposit (CDs) - introduced since June 1989 - are unsecured, negotiable, short-term instruments in bearer form, issued by a commercial bank(s)/Financial Institution(s) at discount to face value at market rates, with maturity ranging from 15 days to one year.

Being securities in the form of promissory notes, transfer of title is easy, by endorsement and delivery. Further, they are governed by the Negotiable Instruments Act. As these certificates are the liabilities of commercial banks/financial institutions, they make sound investments.

DFHI trades in these instruments in the secondary market. The market for these instruments is not very deep, but quite often CDs are available in the secondary market. DFHI is always willing to buy these instruments thereby lending liquidity to the market.

CD is a negotiable money market instrument and issued in dematerialized form or as a Usance Promissory Note, for funds deposited at a Bank or other eligible Financial Institution for a specified time period.

Salient features:

- ❖ CDs can be issued to individuals, corporations, companies, trusts, funds, associates, etc.
- ❖ NRIs can subscribe to CDs on non-repatriable basis.
- ❖ CDs attract stamp duty as applicable to negotiable instruments.
- ❖ Banks have to maintain SLR and CRR on the issue price of CDs. No ceiling on the amount to be issued.
- ❖ The minimum issue size of CDs is ₹1 lakh and in multiples thereof.
- ❖ CDs are transferable by endorsement and delivery.
- ❖ The minimum lock-in-period for CDs is 15 days.

CDs are issued by Banks, when the deposit growth is sluggish and credit demand is high and a tightening trend in call rate is evident. CDs are generally considered high cost liabilities and banks have recourse to them only under tight liquidity conditions.

CPs enable highly rated corporate borrowers to diversify their sources of short-term borrowings and raise a part of their requirement at competitive rates from the market. The introduction of Commercial Paper (CP) in January 1990 as an additional money market instrument was the first step towards securitization of commercial bank's advances into marketable instruments.



Eligible issuers of CD: CDs can be issued by - (a) Scheduled Commercial Banks excluding Regional Rural Banks (RRBs) and Local Area Banks (LABs), and (b) select All-India Financial Institutions that have been permitted by RBI to raise short-term resources within the umbrella limit fixed by RBI.

Investors in CD: CDs can be issued to Individuals, Corporations, Companies, Trusts, Funds, Associations, etc. Non-Resident Indians (NRIs) may subscribe to CDs, but only on non-repatriable basis which should be clearly stated on the Certificate. Such CDs cannot be endorsed to another NRI in the secondary market.

Maturity Period: The maturity period shall be as under —

- (a) CD's issued by Banks: Not less than 7 days and not more than 1 year from the date of issue.
- (b) CD's issued by FIs: Not less than 1 year and not exceeding 3 years from the date of issue.

Repayment: There will be no grace period for repayment of CDs. If the maturity date happens to be holiday, the issuing bank should make payment on the immediate preceding working day. Banks/FIs may, therefore, so fix the period of deposit that the maturity date does not coincide with a holiday to avoid loss of discount/ interest rate.

Minimum Size of Issue and Denominations: Minimum amount of a CD should be ₹1 lakh i.e., the minimum deposit that could be accepted from a single subscriber should not be less than ₹1 lakh and in the multiples of ₹1 lakh thereafter.

Aggregate Amount of CD: Banks have the freedom to issue CDs depending on their requirements. An FI may issue CDs within the overall umbrella limit fixed by RBI, i.e., issue of CD together with Term Money Borrowings (TMB), Term Deposits (TD), Commercial Papers (CP) and Inter-Corporate Deposits should not exceed 100% of its Net Owned Funds, as per the latest audited Balance Sheet.

Format of CDs: Issuance of CD will attract stamp duty. Banks / FIs should issue CDs only in the dematerialized form. However, under the Depositories Act, 1996, investors have the option to seek certificate in physical form. Such requests should be reported to RBI separately.

Transferability: Physical CDs are freely transferable by endorsement and delivery. Dematted CDs can be transferred as per the procedure applicable to other demat securities. There is no lock-in period for CDs.

Security Aspect: Physical CDs are freely transferable by endorsement and delivery. So, the CD certificates should be printed on good quality security paper and necessary precautions are taken to guard against tampering with the document. The CD should be signed by two or more authorized signatories.

Duplicate Certificates: In case of the loss of physical CD certificates, duplicate certificates can be issued after compliance of the following: (a) Public Notice in at least one local newspaper, (b) Lapse of a reasonable period (say 15 days) from the date of the notice in newspaper, and (c) Execution of an indemnity bond by the investor to the satisfaction of the issuer of CD. Duplicate Certificate should state so and should only be issued in physical form. No fresh stamping is required.

Discount/ Coupon Rate: CDs may be issued at a discount on face value. Banks/FIs are also allowed to issue CDs on floating rate basis provided the methodology of compiling the floating rate is objective, transparent and market based. The issuing bank/FI is free to determine the discount/coupon rate. The interest rate on floating rate CDs would have to be reset periodically in accordance with a pre-determined formula that indicates the spread over a transparent benchmark.

Reserve Requirements: Banks have to maintain the appropriate reserve requirements, i.e., Cash Reserve Ratio (CRR) and Statutory Liquidity Ratio (SLR), on the issue price of the CDs.

Loans/Buy-backs: Banks / FIs cannot grant loans against CDs. They cannot buy-back their own CDs before maturity.

Payment of Certificate: Since CDs are transferable, the physical certificate may be presented for payment by the last holder and payment shall be made only by a crossed cheque. The holders of dematted CDs will claim the payment through their respective depository participants (DPs) and give transfer/delivery instructions to transfer the demat security. The holder should also communicate to the issuer by a letter/

fax enclosing the copy of the delivery instruction it had given to its DP and intimate the place at which the payment is requested to facilitate prompt payment.

Accounting: Banks/FIs may account the issue price under the head “CDs issued” and show it under Deposits. Accounting entries towards discount will be made as in the case of “Cash Certificates”. Banks/FIs should maintain a register of CDs issued with complete particulars.

Standardized Market Practices and Documentation: Fixed Income Money Market and Derivatives Association of India (FIMMDA) may prescribe, in consultation with the RBI, for operational flexibility and smooth functioning of CD market, any standardized procedure and documentation that are to be followed by the participants, in consonance with the international best practices.

Reporting: Banks should include the amount of CDs in the fortnightly return u/s 42 of RBI Act and also separately indicate the amount so included by way of a footnote in the return. A further fortnightly return is required to be submitted to the RBI within 10 days from the end of the fortnight date.

Market for CPs and CDs

New money market instruments like Certificates of Deposits (CDs) and Commercial Paper (CPs) were introduced in 1989-90 to give greater flexibility to investors in the deployment of their short-term surplus funds.

Commercial paper (CP) is issued by non-banking companies and all-India Financial Institutions (AIFIs) as an unsecured promissory note or in a dematerialized form at a rate of discount not tied to any transaction. It is privately placed with investors through the agency of banks. Banks act as both principals (i.e., as counter parties in purchases and sales) and agents in dealership and placement. Banks are not allowed to either underwrite or co-accept issue of CP.

Conditions relating to issuing of CPs have been relaxed gradually with a view to broad-basing the market. For instance, the maturity period has been changed from 91 days-6 months earlier to 15 days-1 year. The minimum size of CPs has also been reduced from ₹1 crore to ₹5 lakhs. The issuer base has been widened by allowing PDs, SDs and AIFIs, apart from corporates, to issue CPs to access short-term funds.

The limit for issuance of CP, which was initially carved out of the maximum permissible bank finance (MPBF), was later linked to be cash credit component of MPBF. With the cash credit component gradually shrinking and, thereby, restricting the development of CP, the issuance limit was delinked from the cash credit limit in October 1997. Initially, banks were required to restore the cash credit limit on the maturity of the paper, guaranteeing the issuer funds at the point of redemption. This “stand-by” facility was withdrawn in October 1994 to impart a measure of independence to CP as a money market instrument. Banks could be approached for a restoration of the original cash credit limit at a later date, the sanction of which was left to their discretion. The credit rating requirement, initially an enabling condition for issuing CP, gradually turned to signal the issuer’s position in the market. The Reserve Bank converted CP into a stand-alone product effective October 2000, with a view of enabling the issuers in the services sector to meet short-term working capital requirements and, at the same time, according banks and FIs the flexibility to fix working capital limits after taking into account the resource pattern of companies’ finances including CPs Trading in the dematerialized form, which was introduced recently, is likely to reduce transactions costs.

The pricing of CP usually lies between the scheduled commercial banks’ lending rate since corporates do not otherwise have the incentive to issue CP) and some representative money market rate (which represents the opportunity cost of bank funds). The Indian CP market is driven by the demand for CP by scheduled commercial banks, which, in turn, is governed by bank liquidity.

The FIMMDA has prepared and made public the guidelines and documentation procedures for issuing CDs. The minimum denomination of CD was reduced to ₹1 lakh in June 2002 in order to increase the investor base. As a further step towards transparency, banks and FIs were required to issue CDs only in the dematerialized form with effect from June 30, 2002, without prejudice to the provisions of Depositories’ Act 1996. Existing, outstandings of CDs need to be converted into the demat form by October 2002.



The market for certificates of deposit (CDs) has remained buoyant during the recent year, reflecting their cost attractiveness to banks vis-a-vis time deposits as well as banks' demand for funds in the wake of the acceleration in demand for bank credit. The amount of CDs outstanding doubled from ₹14,975 crore in early April 2005 to ₹30,445 crore by December 9, 2005 mainly on account of higher issuances by some private sector banks. The higher recourse to CDs was also driven by the reduction in the minimum maturity period to seven days. Outstanding CDs were 3.0 percent of aggregate deposits of issuing banks as on December 9, 2005, up from 2.0 percent a year ago. The typical three-month discount rate on CDs at 6.50 percent on December 9, 2005 was higher by about 60 basis point over its level at end-March 2005. As in the case of CPs, mutual funds have emerged as key investors in CDs.

Amongst other money segments, the market for forward rate agreements and interest rate swaps (FRAs/IRS) continued to expand with the participation of select public sector banks primary dealers (PDs) and foreign and private sector banks.

F. Collateralised borrowing and Lending Obligation (CBLO):

The Clearing Corporation of India Ltd. (CCIL) launched a new product- CBLO- on January 20, 2003 to provide liquidity to non-bank entities hit by restrictions on access to the call money market. CBLO is a discounted instrument available in electronic book entry for the maturity period ranging from 1 day to 19 days. The maturity period can range up to one year as per the RBI guidelines. The CBLO is an obligation by the borrower to return the borrowed money, at a specified future date, and an authority to the lender to receive money lent, at a specified future date with an option/privilege to transfer the authority to another person for value received. The eligible securities are central government securities including treasury bills with a residual maturity period of more than six months. There are no restrictions on the minimum denomination as well as lock-in period for its secondary market transactions.

Banks, Cooperative Banks, Financial Institutions, Insurance Companies, Mutual funds, and Primary Dealers who are members of negotiated dealing system (NDS) are allowed to participate in CBLO transactions. Non-members like corporate, NBFCs, pension/provident funds, and trusts are allowed to participate by obtaining associate membership to CBLO segment.

There are two types of markets available for trading in CBLO: the normal market and the auction market. Under normal market, there are two settlement cycles available to members, viz, T+0 and T+1. Normal market is available for all members including associate members. Auction market is available only to NDS members for overnight borrowing and settlement on T+0 basis. Associate members are not allowed to borrow and lend funds in auction market. Currently, the minimum order lot for normal market is fixed at ₹50lakh and in multiples of ₹5lakh thereof. The minimum order lot for normal market is fixed at ₹5lakh and in multiples of ₹5lakh thereof. Order lot refers to the minimum amount that is required to constitute a successful trade in the auction and normal market.

As the repayment of borrowing under CBLO segment is guaranteed by CCIL, all CBLO members have to maintain collateral or cash margin with the CCIL as cover. CCIL sets up borrowing limits for the members against their deposits of government securities as collaterals.

In order to increase the depth and liquidity in the CBLO market, CCIL is planning to introduce an internet-based trading platform for its CBLO product which would provide access to corporate and other non-banking entities to the institutional lending and borrowing segment of money markets.

2.4 GOVERNMENT SECURITIES AND BONDS

Government Securities

A Government security is a tradable instrument issued by the Central Government or the State Governments. It acknowledges the Government's debt obligation. Such securities are short term (usually called treasury bills, with original maturities of less than one year) or long term (usually called Government bonds or dated securities with original maturity of one year or more). In India, the Central Government issues both, treasury bills and bonds or dated securities while the State Governments issue only bonds

or dated securities, which are called the State Development Loans (SDLs). Government securities carry practically no risk of default and, hence, are called risk-free gilt-edged instruments. Government of India also issues savings instruments (Savings Bonds, National Saving Certificates (NSCs), etc.) or special securities (oil bonds, Food Corporation of India bonds, fertilizer bonds, power bonds, etc.). They are, usually not fully tradable and are, therefore, not eligible to be SLR securities.

Government Securities are mostly interest bearing dated securities issued by RBI on behalf of the Government of India. GOI uses these funds to meet its expenditure commitments. These securities are generally fixed maturity and fixed coupon securities carrying semi-annual coupon. Since the date of maturity is specified in the securities, these are known as dated Government Securities, e.g. 8.24% GOI 2018 is a Central Government Security maturing in 2018, which carries a coupon of 8.24% payable half yearly.

Features of Government Securities

- 1) Issued at face value.
- 2) No default risk as the securities carry sovereign guarantee.
- 3) Ample liquidity as the investor can sell the security in the secondary market.
- 4) Interest payment on a half yearly basis on face value.
- 5) No tax deducted at source.
- 6) Can be held in demat form.
- 7) Rate of interest and tenor of the security is fixed at the time of issuance and is not subject to change (unless intrinsic to the security like FRBs - Floating Rate Bonds).
- 8) Redeemed at face value on maturity.
- 9) Maturity ranges from 91 days-30 years.
- 10) Government Securities qualify as SLR (Statutory Liquidity Ratio) investments, unless otherwise stated.

Government Securities- Types

- 1) **Treasury Bills.**
- 2) **Government Bonds or Dated Securities.**
- 3) **State Development Loans.**
- 4) **Any other security created and issued by the Government in such form and for such of the purposes of the Act as may be prescribed.**

Government Securities- Issuers

Government securities are issued by the following agencies:

- 1) **Central Government.**
- 2) **State Government.**
- 3) **Semi-government Authorities.**
- 4) **Public sector undertakings.**

Government Securities- Issue Procedure

Government securities are issued through auctions conducted by the RBI. Auctions are conducted on the electronic platform called the NDS – Auction platform. Commercial banks, scheduled urban co-operative banks, Primary Dealers, insurance companies and provident funds, who maintain funds account (current account) and securities accounts (SGL account) with RBI, are members of this electronic platform. All



members of PDO-NDS can place their bids in the auction through this electronic platform. All non-NDS members including non-scheduled urban co-operative banks can participate in the primary auction through scheduled commercial banks or Primary Dealers. For this purpose, the urban co-operative banks need to open a securities account with a bank / Primary Dealer – such an account is called a Gilt Account. A Gilt Account is a dematerialized account maintained by a scheduled commercial bank or Primary Dealer for its constituent (e.g., a non-scheduled urban co-operative bank).

The RBI, in consultation with the Government of India, issues an indicative half-yearly auction calendar which contains information about the amount of borrowing, the tenor of security and the likely period during which auctions will be held. A Notification and a Press Communique giving exact particulars of the securities, viz., name, amount, type of issue and procedure of auction are issued by the Government of India about a week prior to the actual date of auction. RBI places the notification and a Press Release on its website (www.rbi.org.in) and also issues an advertisement in leading English and Hindi newspapers. Information about auctions is also available with the select branches of public and private sector banks and the Primary Dealers.

Risks involved in holding Government securities:

Government securities are generally referred to as risk free instruments as sovereigns are not expected to default on their payments. However, as is the case with any financial instrument, there are risks associated with holding the Government securities. Hence, it is important to identify and understand such risks and take appropriate measures for mitigation of the same. The following are the major risks associated with holding Government securities.

- i) **Market risk** – Market risk arises out of adverse movement of prices of the securities that are held by an investor due to changes in interest rates. This will result in booking losses on marking to market or realizing a loss if the securities are sold at the adverse prices. Small investors, to some extent, can mitigate market risk by holding the bonds till maturity so that they can realize the yield at which the securities were actually bought.
- ii) **Reinvestment risk** – Cash flows on a Government security includes fixed coupon every half year and repayment of principal at maturity. These cash flows need to be reinvested whenever they are paid. Hence there is a risk that the investor may not be able to reinvest these proceeds at profitable rates due to changes in interest rate scenario.
- iii) **Liquidity risk** – Liquidity risk refers to the inability of an investor to liquidate (sell) his holdings due to non availability of buyers for the security, i.e., no trading activity in that particular security. Usually, when a liquid bond of fixed maturity is bought, its tenor gets reduced due to time decay. For example, a 10 year security will become 8 year security after 2 years due to which it may become illiquid. Due to illiquidity, the investor may need to sell at adverse prices in case of urgent funds requirement. However, in such cases, eligible investors can participate in market repo and borrow the money against the collateral of the securities.

Technique for Mitigating the Risks:

Risk Mitigation

Holding securities till maturity could be a strategy through which one could avoid market risk. Rebalancing the portfolio wherein the securities are sold once they become short term and new securities of longer tenor are bought could be followed to manage the portfolio risk. However, rebalancing involves transaction and other costs and hence needs to be used judiciously. Market risk and reinvestment risk could also be managed through Asset Liability Management (ALM) by matching the cash flows with liabilities. ALM could also be undertaken by matching the duration of the cash flows.

Advanced risk management techniques involve use of derivatives like Interest Rate Swaps (IRS) through which the nature of cash flows could be altered. However, these are complex instruments requiring advanced level of expertise for proper understanding. Adequate caution, therefore, need to be observed for undertaking the derivatives transactions and such transactions should be undertaken only after having complete understanding of the associated risks and complexities.

Dated Government Securities

Dated Government securities are long term securities and carry a fixed or floating coupon (interest rate) which is paid on the face value, payable at fixed time periods (usually half-yearly). The tenor of dated securities can be up to 30 years.

The Public Debt Office (PDO) of the Reserve Bank of India acts as the registry / depository of Government securities and deals with the issue, interest payment and repayment of principal at maturity. Most of the dated securities are fixed coupon securities.

The nomenclature of a typical dated fixed coupon Government security contains the following features - coupon, name of the issuer, maturity and face value. For example, 7.49% GS 2017 would mean:

Coupon	: 7.49% paid on face value
Name of Issuer	: Government of India
Date of Issue	: April 16, 2007
Maturity	: April 16, 2017
Coupon Payment Dates	: Half-yearly (October 16 and April 16) every year
Minimum Amount of issue/ sale	: ₹10,000

In case there are two securities with the same coupon and are maturing in the same year, then one of the securities will have the month attached as suffix in the nomenclature. For example, 6.05% GS 2019 FEB, would mean that Government security having coupon 6.05 % that mature in February 2019 along with the other security with the same coupon, namely, 6.05% 2019 which is maturing in June 2019.

If the coupon payment date falls on a Sunday or a holiday, the coupon payment is made on the next working day. However, if the maturity date falls on a Sunday or a holiday, the redemption proceeds are paid on the previous working day itself.

The dated Government securities market in India has two segments:

- 1) Primary Market:** The Primary Market consists of the issuers of the securities, viz., Central and State Government and buyers include Commercial Banks, Primary Dealers, Financial Institutions, Insurance Companies & Co-operative Banks. RBI also has a scheme of non-competitive bidding for small investors (see SBI DFHI Invest on our website for further details).
- 2) Secondary Market:** The Secondary Market includes Commercial banks, Financial Institutions, Insurance Companies, Provident Funds, Trusts, Mutual Funds, Primary Dealers and Reserve Bank of India. Even Corporates and Individuals can invest in Government Securities. The eligibility criteria is specified in the relative Government notification.

Auctions: Auctions for government securities are either multiple- price auctions or uniform price auction - either yield based or price based.

Yield Based: In this type of auction, RBI announces the issue size or notified amount and the tenor of the paper to be auctioned. The bidders submit bids in term of the yield at which they are ready to buy the security. If the Bid is more than the cut-off yield then its rejected otherwise it is accepted

Price Based: In this type of auction, RBI announces the issue size or notified amount and the tenor of the paper to be auctioned, as well as the coupon rate. The bidders submit bids in terms of the price. This method of auction is normally used in case of reissue of existing Government Securities. Bids at price lower than the cut off price are rejected and bids higher than the cut off price are accepted. Price Based auction leads to a better price discovery than the Yield based auction.

Underwriting in Auction: One day prior to the auction, bids are received from the Primary Dealers (PD) indicating the amount they are willing to underwrite and the fee expected. The auction committee of



RBI then examines the bid on the basis of the market condition and takes a decision on the amount to be underwritten and the fee to be paid. In case of devolvment, the bids put in by the PD's are set off against the amount underwritten while deciding the amount of devolvment and in case the auction is fully subscribed, the PD need not subscribe to the issue unless they have bid for it.

G-Secs, State Development Loans & T-Bills are regularly sold by RBI through periodic public auctions. SBI DFHI Ltd. is a leading Primary Dealer in Government Securities. SBI DFHI Ltd gives investors an opportunity to buy G-Sec / SDLs / T-Bills at primary market auctions of RBI through its SBI DFHI Invest scheme (details available on website). Investors may also invest in high yielding Government Securities through "SBI DFHI Trade" where "buy and sell price" and a buy and sell facility for select liquid scrips in the secondary markets is offered.

Open Market Operations (OMOs)

OMOs are the market operations conducted by the Reserve Bank of India by way of sale/ purchase of Government securities to/ from the market with an objective to adjust the rupee liquidity conditions in the market on a durable basis. When the RBI feels there is excess liquidity in the market, it resorts to sale of securities thereby sucking out the rupee liquidity. Similarly, when the liquidity conditions are tight, the RBI will buy securities from the market, thereby releasing liquidity into the market.

Buyback of Government securities

Buyback of Government securities is a process whereby the Government of India and State Governments buy back their existing securities from the holders. The objectives of buyback can be reduction of cost (by buying back high coupon securities), reduction in the number of outstanding securities and improving liquidity in the Government securities market (by buying back illiquid securities) and infusion of liquidity in the system. Governments make provisions in their budget for buying back of existing securities. Buyback can be done through an auction process or through the secondary market route, i.e., NDS/NDS-OM.

Liquidity Adjustment Facility (LAF)

LAF is a facility extended by the Reserve Bank of India to the scheduled commercial banks (excluding RRBs) and primary dealers to avail of liquidity in case of requirement or park excess funds with the RBI in case of excess liquidity on an overnight basis against the collateral of Government securities including State Government securities. Basically LAF enables liquidity management on a day to day basis. The operations of LAF are conducted by way of repurchase agreements (repos and reverse repos – please refer to paragraph numbers 30.4 to 30.8 under question no. 30 for details) with RBI being the counterparty to all the transactions. The interest rate in LAF is fixed by the RBI from time to time. Currently the rate of interest on repo under LAF (borrowing by the participants) is 6.25% and that of reverse repo (placing funds with RBI) is 5.25%. LAF is an important tool of monetary policy and enables RBI to transmit interest rate signals to the market.

Government Securities- Form in which held

The Public Debt Office (PDO) of the Reserve Bank of India, Mumbai acts as the registry and central depository for the Government securities. Government securities may be held by investors either as physical stock or in dematerialized form. From May 20, 2002, it is mandatory for all the RBI regulated entities to hold and transact in Government securities only in dematerialized (SGL) form. Accordingly, UCBs are required to hold all Government securities in demat form.

- a) **Physical form:** Government securities may be held in the form of stock certificates. A stock certificate is registered in the books of PDO. Ownership in stock certificates cannot be transferred by way of endorsement and delivery. They are transferred by executing a transfer form as the ownership and transfer details are recorded in the books of PDO. The transfer of a stock certificate is final and valid only when the same is registered in the books of PDO.
- b) **Demat form:** Holding government securities in the dematerialized or scripless form is the safest and the most convenient alternative as it eliminates the problems relating to custody, viz., loss of

security. Besides, transfers and servicing are electronic and hassle free. The holders can maintain their securities in dematerialised form in either of the two ways:

- i) **SGL Account:** Reserve Bank of India offers Subsidiary General Ledger Account (SGL) facility to select entities who can maintain their securities in SGL accounts maintained with the Public Debt Offices of the Reserve Bank of India.
- ii) **Gilt Account:** As the eligibility to open and maintain an SGL account with the RBI is restricted, an investor has the option of opening a Gilt Account with a bank or a Primary Dealer which is eligible to open a Constituents' Subsidiary General Ledger Account (CSGL) with the RBI. Under this arrangement, the bank or the Primary Dealer, as a custodian of the Gilt Account holders, would maintain the holdings of its constituents in a CSGL account (which is also known as SGL II account) with the RBI. The servicing of securities held in the Gilt Accounts is done electronically, facilitating hassle free trading and maintenance of the securities. Receipt of maturity proceeds and periodic interest is also faster as the proceeds are credited to the current account of the custodian bank / PD with the RBI and the custodian (CSGL account holder) immediately passes on the credit to the Gilt Account Holders (GAH).

Investors also have the option of holding Government securities in a dematerialized account with a depository (NSDL / CDSL, etc.). This facilitates trading of Government securities on the stock exchanges.

Government securities- Trading Mechanism

There is an active secondary market in Government securities. The securities can be bought / sold in the secondary market either (i) Over the Counter (OTC) or (ii) through the Negotiated Dealing System (NDS) or (iii) the Negotiated Dealing System-Order Matching (NDS-OM).

- (i) **Over the Counter (OTC)/ Telephone Market:** In this market, a participant, who wants to buy or sell a government security, may contact a bank / Primary Dealer / financial institution either directly or through a broker registered with SEBI and negotiate for a certain amount of a particular security at a certain price. Such negotiations are usually done on telephone and a deal may be struck if both counterparties agree on the amount and rate. In the case of a buyer, like an urban co-operative bank wishing to buy a security, the bank's dealer (who is authorized by the bank to undertake transactions in Government Securities) may get in touch with other market participants over telephone and obtain quotes. Should a deal be struck, the bank should record the details of the trade in a deal slip and send a trade confirmation to the counterparty. The dealer must exercise due diligence with regard to the price quoted by verifying with available sources. All trades undertaken in OTC market are reported on the secondary market module of the NDS.
- (ii) **Negotiated Dealing System:** The Negotiated Dealing System (NDS) for electronic dealing and reporting of transactions in government securities was introduced in February 2002. It facilitates the members to submit electronically, bids or applications for primary issuance of Government Securities when auctions are conducted. NDS also provides an interface to the Securities Settlement System (SSS) of the Public Debt Office, RBI, Mumbai thereby facilitating settlement of transactions in Government Securities (both outright and repos) conducted in the secondary market. Membership to the NDS is restricted to members holding SGL and/or Current Account with the RBI, Mumbai.

In August, 2005, RBI introduced an anonymous screen based order matching module on NDS, called NDS-OM. This is an order driven electronic system, where the participants can trade anonymously by placing their orders on the system or accepting the orders already placed by other participants. NDS-OM is operated by the Clearing Corporation of India Ltd. (CCIL) on behalf of the RBI. Direct access to the NDS-OM system is currently available only to select financial institutions like Commercial Banks, Primary Dealers, Insurance Companies, Mutual Funds, etc. Other participants can access this system through their custodians, i.e., with whom they maintain Gilt Accounts. The custodians place the orders on behalf of their customers like the urban co-operative banks. The advantages of NDS-OM are price transparency and better price discovery.



Gilt Account holders have been given indirect access to NDS through custodian institutions. A member (who has the direct access) can report on the NDS the transaction of a Gilt Account holder in government securities. Similarly, Gilt Account holders have also been given indirect access to NDS-OM through the custodians. However, currently two gilt account holders of the same custodian are not permitted to undertake repo transactions between themselves.

- iii) **Stock Exchanges:** Facilities are also available for trading in Government securities on stock exchanges (NSE, BSE) which cater to the needs of retail investors.

Government Securities market- Major Players

Major players in the Government securities market include commercial banks and primary dealers besides institutional investors like insurance companies. Primary Dealers play an important role as market makers in Government securities market. Other participants include co-operative banks, regional rural banks, mutual funds, provident and pension funds. Foreign Institutional Investors (FIIs) are allowed to participate in the Government securities market within the quantitative limits prescribed from time to time. Corporates also buy/ sell the government securities to manage their overall portfolio risk.

Bonds:

Bond is a negotiable certificate evidencing indebtedness. It is normally unsecured. A debt security is generally issued by a company, municipality or government. A bond investor lends money to the issuer and in exchange, the issuer promises to repay the loan amount on a specified maturity date. The issuer usually pays the bond holder periodic interest payments over the life of the bond.

Bonds are the instruments of borrowing by governments and corporate. They promise a fixed rate of return, known as a coupon rate, till the date of maturity and the payback of the principal sum in a phased manner or at maturity.

There are two categories of bonds- those issued by government and those issued by firms (also known as debentures). From the perspective of risk, the bonds issued by the government are regarded as risk free, while those issued by firms are deemed to bear default risk.

Features of Bond:

The terms and conditions for the issue of bonds are pre-decided at the time of the issue as a part of bond indenture.

- i) **Face value:** Face value, also referred as par value, of the bond is the amount of money that is stated on the face of the instrument. Usually, bonds are issued with the face value of ₹100 or ₹1000, though there is no such rule that prescribes the face value.
- ii) **Coupon rate:** The rate of interest payable by the issuer to the subscriber of the bond is referred to as the coupon rate.
- iii) **Periodicity of coupon payment:** The coupon rate of the bond is specified as annual interest payment. However, the issuer may decide to pay the interest at regular intervals as opposed to annual payments.
- iv) **Maturity:** The principal sum borrowed through the issue of bonds is for a finite period of time that is predetermined and specified at the time of issue. The duration from the date of issue until the bonds are redeemed is referred to as the maturity period of the bond.
- v) **Redemption value:** At the end of maturity, the borrowed sum must be refunded. The amount of money paid at the time of maturity is referred to as the redemption value.

Types of Bond:

▪ Zero Coupon Bond:

- ✓ Zero Coupon Bond is issued at a discount and repaid at face value. No periodic interest is paid.
- ✓ The difference between the issue price and redemption price represents the return to the holder.

- **Convertible Bond:** Bond which carries an option to convert the bond into Equity at a fixed conversion price.
- **Bearer Bonds:** It is an official certificate issued without recording the name of the holder. These are very risky because they can be either lost or stolen.
- **Registered Bonds:** It is a bond whose ownership is recorded by the issuer or by a transfer agent.
- **Term Bonds:** Most corporate bonds are term bonds, that is, they run for a specific term of years and then become due and payable.
- **Serial Bonds:** While issuing bonds some corporate arrange them in such a way that specific principal amounts become due on specified dates prior to maturity. They are termed as serial bonds.
- **Puttable Bonds:** A puttable bond grants the bondholder the right to sell the issue back to the issuer at par value on designated dates.
- **Callable Bonds:** These bonds refer to the ability of the issuer to pay off a debt obligation prior to its maturity at the option of the issuer of debt.
- **Exchangeable Bonds:** It grants the bondholder the right to exchange the bonds for the common stock of a firm other than that of the issuer of the bond.
- **Fixed Rate Bonds:** These are bonds with a coupon or a stated rate of interest which remains constant throughout the life of the bond.
- **High Yield Bonds:** They are bonds that are rated below investment grade by the credit rating agencies. They are also called junk bonds.
- **Mortgage Bonds:** A bond that is secured through a lien against the property of the firm is known as mortgage bond.
- **Subordinated Bonds:** These bonds have a lower priority than secured debts, debentures and other bonds and the general creditors of the issuer in case of liquidation.
- **Guaranteed Bonds:** It is an obligation guaranteed by another entity.
- **Perpetual Bonds:** These bonds are also called perpetuities. It has no maturity date.
- **Global bonds:** Bonds that are designed so as to qualify for immediate trading in any domestic capital market and in the Euro market are called global bonds.
- **Easy Exit Bonds:** These are bonds which provide easy liquidity and exit route to investors by way of redemption or buy back facility where investors can get the benefit of ready encashment in case of need to withdraw before maturity.
- **Option Bonds:** These are cumulative and non-cumulative bonds where interest is payable on maturity or periodically. Redemption premium is also offered to attract investors. These were issued by institutions like IDBI, ICICI, etc.
- **Double Option Bonds:** The face value of each bond is ₹5,000. The bond carries interest at 15% p.a. compounded half-yearly from the date of allotment. The bond has a maturity period of 10 years. Each bond has two parts in the form of two separate certificates, one for principal of ₹5,000 and other for interest (including redemption premium) of ₹16,500. Both these certificates are listed on all major stock exchanges. The Investor has the facility of selling either one or both parts at anytime he wishes so.
- **Floating Rate Bonds:** Here, Interest rate is not fixed and is allowed to float depending upon the market conditions. This is an instrument used by the issuing Companies to hedge themselves against the volatility in the interest rates. Financial institutions like IDBI, ICICI, etc. have raised funds from these bonds.



- **Inflation Bonds:** Inflation Bonds are bonds in which interest rate is adjusted for inflation. Thus, the investor gets an interest free from the effects of inflation. For example, if the interest rate is 10% and the inflation is 2%, the investor will earn 12.20% [i.e. $(1 + \text{Interest Rate}) \times (1 + \text{Inflation Rate}) - 1$]. This is similar to Floating Rate Bonds, i.e. rate of return varies over a period of time.

2.5 REPO AND REVERSE REPO

Repo or ready forward contract is an instrument for borrowing funds by selling securities with an agreement to repurchase the said securities on a mutually agreed future date at an agreed price which includes interest for the funds borrowed. Repo rate is the return earned on a repo transaction expressed as an annual interest rate.

The reverse of the repo transaction is called 'reverse repo' which is lending of funds against buying of securities with an agreement to resell the said securities on a mutually agreed future date at an agreed price which includes interest for the funds lent.

It can be seen from the definition above that there are two legs to the same transaction in a repo/ reverse repo. The duration between the two legs is called the 'repo period'. Predominantly, repos are undertaken on overnight basis, i.e., for one day period. Settlement of repo transactions happens along with the outright trades in government securities.

The consideration amount in the first leg of the repo transactions is the amount borrowed by the seller of the security. On this, interest at the agreed 'repo rate' is calculated and paid along with the consideration amount of the second leg of the transaction when the borrower buys back the security. The overall effect of the repo transaction would be borrowing of funds backed by the collateral of Government securities.

The money market is regulated by the Reserve Bank of India. All the above mentioned money market transactions should be reported on the electronic platform called the Negotiated Dealing System (NDS).

As part of the measures to develop the corporate debt market, RBI has permitted select entities (scheduled commercial banks excluding RRBs and LABs, PDs, all-India FIs, NBFCs, mutual funds, housing finance companies, insurance companies) to undertake repo in corporate debt securities. This is similar to repo in Government securities except that corporate debt securities are used as collateral for borrowing funds. Only listed corporate debt securities that are rated 'AA' or above by the rating agencies are eligible to be used for repo. Commercial paper, certificate of deposit, non-convertible debentures of original maturity less than one year are not eligible for the purpose. These transactions take place in the OTC market and are required to be reported on FIMMDA platform within 15 minutes of the trade for dissemination of information. They are also to be reported on the clearing house of any of the exchanges for the purpose of clearing and settlement.

Features of Repo:

- 1) Banks and primary dealers are allowed to undertake both repo and reverse repo transactions.
- 2) It is a collateralized short term lending and borrowing agreement.
- 3) It serves as an outlet for deploying funds on short-term basis.
- 4) The interest rates depend on the demand and supply of the short-term surplus/deficit amongst the interbank players.
- 5) In addition to T-Bills all Central and State Government securities are eligible for repo.
- 6) No sale of securities should be affected unless the securities are actually held by the seller in his own investment portfolio.

- 7) Immediately on sale, the corresponding amount should be reduced from the investment account of the seller.
- 8) The securities under repo should be marked to market on the balance sheet.

Participants: Buyer in a Repo is usually a Bank which requires approved securities in its investment portfolio to meet the Statutory Liquidity Ratio (SLR).

Types of Repo:

- ❖ **Overnight Repo:** When the term of the loan is for one day, it is known as an overnight repo. Most repos are overnight transactions, with the purchase and sale taking place one day and being reversed the next day.
- ❖ **Term Repo:** When the term of the loan is for more than one day it is called a term repo. Long-term repos which are as such can be extended for a month or more.
- ❖ **Open Repo:** Open repo simply has no end date. Usually, repos are for a fixed period of time, but open-ended deals are also possible.

Interest:

- a) **Computation:** Interest for the period of Repo is the difference between Sale Price and Purchase Price.
- b) **Recognition:** Interest should be recognized on a time-proportion basis, both in the books of the buyer and seller.

RBI Guidelines:

- a) Accounting for Repo / Reverse Repo transactions should reflect their legal form, viz., an outright purchase and outright sale.
- b) Thus securities sold under Repo would not be included in the Investment Account of the seller, instead, these would be included by the Buyer in its Investment Account.
- c) The buyer can consider the approved securities acquired under Reverse Repo Transactions for the purpose of SLR during the period of the Repo.

Sale Price of Securities: Sale of Securities should be recognized by the Seller at prevailing market rate comprising of accrued interest to date and the clean price. Repurchase of Securities by the Seller, would be at the above Market Rate plus Interest for the period of Repo.

Consider a situation where Bank X wants to raise funds from Bank Y for fifteen days at a repo rate of 9.00% p.a. The securities for this transaction is an 8% semi-annual coupon (Coupon date 25th April and 25th October) of face value ₹500 million which is presently trading at 98.2 for ₹100 face value. Hence the amount that Bank x will borrow from Bank Y = Ex-interest price of the security + accrued interest based on 30/360 day count convention.

Ex-interest price = 98.2% of 500 = 491 million

Add : Accrued interest for 25th October to 12th February i.e. 107 days = $8\% \text{ of } 500 \times 107/360 = 11.89$

∴ Amount borrowed = $491 + 11.89 = 502.89$

Repo interest based on actual 360 days count convention = $9\% \text{ of } 502.89 \times 15/365 = 1.86 \text{ million}$

Amount to be repaid by Bank x after 15 days = $502.89 + 1.86 = ₹504.75 \text{ million}$.

This includes accrued interest for 107 + 15 i.e. 122 days = $11.89/107 \times 122 = ₹13.56 \text{ m}$

Ex-interest re-purchase price = $504.75 - 13.56 = ₹491.19 \text{ m}$

2.6 PROMISSORY NOTE

A written, dated and signed two-party instrument containing an unconditional promise by the maker to pay a definite sum of money to a payee on demand or at a specified future date.

Essentials of a Promissory Note:

- ❖ It must be in writing.
- ❖ It must not be a bank note or a currency note.
- ❖ It must contain unconditional undertaking.
- ❖ It must be signed by the maker.
- ❖ The undertaking must be to pay on demand or at a fixed or determinable future time.
- ❖ The undertaking must be to pay a certain sum of money.
- ❖ The money must be payable to a certain person or to his order, or to the bearer of the instrument.

“Derivative Usance Promissory Notes” (DUPN)

Derivative Usance Promissory Notes is an innovative instrument issued by the RBI to eliminate movement of papers and facilitating easy multiple rediscounting.

Features:

- (a) Backing: DUPN is backed by up to 90 days Usance Commercial bills.
- (b) Stamp Duty: Government has exempted stamp duty on DUPN to simplify and stream line the instrument and to make it an active instrument in the secondary market.
- (c) Period: The minimum rediscounting period is 15 days.
- (d) Transfer: DUPN is transferable by endorsement and delivery and hence is liquid.
- (e) Regulated Entry: RBI has widened the entry regulation for bill market by selectively allowing, besides banks and PDs, Co-operative Banks, Mutual Funds and financial institutions.
- (f) Rediscounting: DFHI trades in these instruments by rediscounting DUPNs drawn by commercial banks. DUPNs which are sold to investors may also be purchased by DFHI.

2.7 FUTURES, OPTIONS AND OTHER DERIVATIVES

2.7.1 Financial Derivative

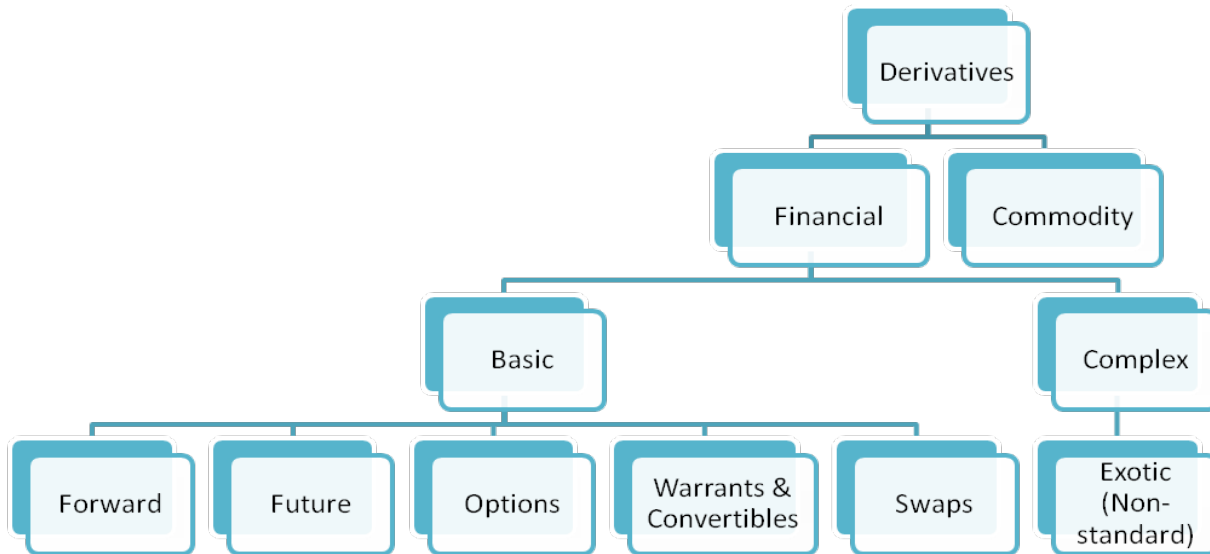
The term “Derivative” indicates that it has no independent value, i.e., its value is entirely derived from the value of the underlying asset. The underlying asset can be securities, commodities, bullion, currency, livestock or anything else. In other words, derivative means forward, futures, option or any other hybrid contract of predetermined fixed duration, linked for the purpose of contract fulfillment to the value of a specified real or financial asset or to an index of securities.

The Securities Contracts (Regulation) Act 1956 defines “derivative” as under:

“Derivative” includes

1. Security derived from a debt instrument, share, loan whether secured or unsecured, risk instrument or contract for differences or any other form of security.
2. A contract which derives its value from the prices, or index of prices of underlying securities.

The derivatives can be classified into different categories which are shown in the Figure below:



2.7.2 Forward contracts

A forward contract is a simple customized contract between two parties to buy or sell an asset at a certain time in the future for a certain price. Unlike future contracts, they are not traded on an exchange, rather traded in the over-the-counter market, usually between two financial institutions or between a financial institution and one of its client.

Example: An Indian company buys Automobile parts from USA with payment of one million dollar due in 90 days. The importer, thus, is short of dollar i.e., it owes dollars for future delivery. Suppose present price of dollar is ₹48. Over the next 90 days, however, dollar might rise against ₹48. The importer can hedge this exchange risk by negotiating a 90 days forward contract with a bank at a price ₹50. According to forward contract in 90 days the bank will give importer one million dollar and importer will give the bank 50 million rupees hedging a future payment with forward contract. On the due date importer will make a payment of ₹50 million to bank and the bank will pay one million dollar to importer, whatever rate of the dollar is after 90 days. So this is a typical example of forward contract on currency.

The basic features of a forward contract are given in brief here as under:

- 1) Forward contracts are bilateral contracts, and hence, they are exposed to counter-party risk. There is risk of non-performance of obligation either of the parties, so these are riskier than to futures contracts.
- 2) Each contract is custom designed, and hence, is unique in terms of contract size, expiration date, the asset type, quality, etc.
- 3) In forward contract, one of the parties takes a long position by agreeing to buy the asset at a certain specified future date. The other party assumes a short position by agreeing to sell the same asset at the same date for the same specified price. A party with no obligation offsetting the forward contract is said to have an open position. A party with a closed position is, sometimes, called a hedger.
- 4) The specified price in a forward contract is referred to as the delivery price. The forward price for a particular forward contract at a particular time is the delivery price that would apply if the contract were entered into at that time. It is important to differentiate between the forward price and the delivery price. Both are equal at the time the contract is entered into. However, as time passes, the forward price is likely to change whereas the delivery price remains the same.
- 5) In the forward contract, derivative assets can often be contracted from the combination of underlying assets, such assets are often known as synthetic assets in the forward market.

2.7.3 Futures contracts

Like a forward contract, a futures contract is an agreement between two parties to buy or sell a specified quantity of an asset at a specified price and at a specified time and place. Futures contracts are normally traded on an exchange which sets the certain standardized norms for trading in the futures contracts.

Example: A silver manufacturer is concerned about the price of silver, since he will not be able to plan for profitability. Given the current level of production, he expects to have about 20,000 ounces of silver ready in next two months. The current price of silver on May 10 is ₹1052.5 per ounce, and July futures price at FMC is ₹1068 per ounce, which he believes to be satisfied price. But he fears that prices in future may go down. So he will enter into a futures contract. He will sell four contracts at MCX where each contract is of 5000 ounces at ₹1068 for delivery in July.

Table: Perfect Hedging Using Futures

Date	Spot Market	Future Market
May 10	Anticipate the sale of 20,000 ounce in two months and expect to receive ₹1068 per ounce or a total ₹2,13,60,000	Sell four contracts 5,000 ounce each July, future contracts at ₹1068 per ounce
July 5	The spot price of silver is ₹1071 per ounce, Miner sells 20,000 ounces and receives ₹2,14,20,000	Buy four contracts at ₹1071, total cost of 20,000 ounce will be ₹2,14,20,000
Profit/Loss	Profit = ₹60,000	Futures loss = ₹60,000
Net wealth change = 0		

In the above example trader has hedged his risk of prices fall and the trading is done through standardized exchange which has standardized contract of 5000 ounce silver.

2.7.4 Options contracts

Options are the most important group of derivative securities. Option may be defined as a contract, between two parties whereby one party obtains the right, but not the obligation, to buy or sell a particular asset, at a specified price, on or before a specified date. The person who acquires the right is known as the option buyer or option holder, while the other person (who confers the right) is known as option seller or option writer. The seller of the option for giving such option to the buyer charges an amount which is known as the option premium.

Options can be divided into two types: calls and puts. A call option gives the holder the right to buy an asset at a specified date for a specified price whereas in put option, the holder gets the right to sell an asset at the specified price and time. The specified price in such contract is known as the exercise price or the strike price and the date in the contract is known as the expiration date or the exercise date or the maturity date. The asset or security instrument or commodity covered under the contract is called as the underlying asset. They include shares, stocks, stock indices, foreign currencies, bonds, commodities, futures contracts, etc. Further options can be American or European. A European option can be exercised on the expiration date only whereas an American option can be exercised at any time before the maturity date.

Example: Suppose the current price of CIPLA share is ₹750 per share. X owns 1000 shares of CIPLA Ltd. and apprehends in the decline in price of share. The option (put) contract available at BSE is of ₹800, in next two-month delivery. Premium cost is ₹10 per share. X will buy a put option at 10 per share at a strike price of ₹800. In this way X has hedged his risk of price fall of stock. X will exercise the put option if the price of stock goes down below ₹790 and will not exercise the option if price is more than ₹800, on the exercise date. In case of options, buyer has a limited loss and unlimited profit potential unlike in case of forward and futures.

2.7.5 Warrants and convertibles

Warrants and convertibles are another important categories of financial derivatives, which are frequently traded in the market. Warrant is just like an option contract where the holder has the right to buy shares of a specified company at a certain price during the given time period. In other words, the holder of a warrant instrument has the right to purchase a specific number of shares at a fixed price in a fixed period from a issuing company. If the holder exercised the right, it increases the number of shares of the issuing company, and thus, dilutes the equities of its shareholders. Warrants are usually issued as sweeteners attached to senior securities like bonds and debentures so that they are successful in their equity issues in terms of volume and price. Warrants can be detached and traded separately. Warrants are highly speculative and leverage instruments, so trading in them must be done cautiously.

2.7.6 Swap contracts

Swaps have become popular derivative instruments in recent years all over the world. A swap is an agreement between two counter parties to exchange cash flows in the future. Under the swap agreement, various terms like the dates when the cash flows are to be paid, the currency in which to be paid and the mode of payment are determined and finalized by the parties. Usually the calculation of cash flows involves the future values of one or more market variables.

There are two most popular forms of swap contracts, i.e., interest rate swaps and currency swaps.

2.7.7 Other derivatives

Forwards, futures, options, swaps, etc. are described usually as standard or 'plain vanilla' derivatives. In the early 1980s, some banks and other financial institutions have been very imaginative and designed some new derivatives to meet the specific needs of their clients. These derivatives have been described as 'non-standard' derivatives. The basis of the structure of these derivatives was not unique, for example, some non-standard derivatives were formed by combining two or more 'plain vanilla' call and put options whereas some others were far more complex. In fact, there is no boundary for designing the non-standard financial derivatives, and hence, they are sometimes termed as 'exotic options' or just 'exotics'. There are various examples of such non-standard derivatives such as packages, forward start option, compound options, choose options, barrier options, binary options, look back options, shout options, Asian options, basket options, Standard Oil's Bond Issue, Index Currency Option Notes (ICON), range forward contracts or flexible forwards and so on.

The further details of these instruments are discussed in study note 7.

2.8 MUTUAL FUNDS

Mutual Fund (MF) is a fund established in the form of a Trust, to raise monies through sale of units to the public or a section of the public under one or more schemes for investing in Securities, including Money Market Instruments. [Trust Deed should be duly registered under the Indian Registration Act, 1908.]

Mutual Funds are required to be get registered with the Securities and Exchange Board of India (SEBI).

Activities involved:

- i) **Formulation of Scheme:** A Mutual Fund formulates a scheme with a specified objective to meet the investment needs of various investors i.e. High Return Scheme, Fixed Return Scheme etc. The Scheme should be approved by the Trustees and filed with SEBI.
- ii) **Sale of Units:** Units under the scheme are sold to the investors to collect funds from them.
- iii) **Investment by AMC:** An AMC can invest in any of the schemes of a MF only if full disclosure of its intention to invest has been made in the offer documents. An AMC shall not be entitled to charge any fees on its investment in that scheme.
- iv) **Portfolio Creation:** Resources so received from investors are pooled to create a diversified portfolio of securities by investing the money in instruments, which are in line with the objectives of respective schemes.



- v) **Investment Pattern:** The Investment Pattern of Mutual Funds is governed partly by Government Guidelines and partly by nature and objective of Mutual Fund.
- vi) **Daily Operations:** Daily operations are managed by professionals and Expert Fund Managers who take investment decisions regarding where, when and what to invest and disinvest to get the maximum return as well as higher capital appreciation.
- vii) **Meeting of Expenses:** Expenses like custodial fee, cost of dividend warrants, Registrar's Fee, Asset Management Fee etc, are borne by the respective scheme.
- viii) **Purchase and Repurchase Price:** The purchase and repurchase price of Mutual Funds are generally fixed and also vary in Stock Exchanges if the security is quoted on the basis of its Net Asset Value.
- ix) **Maturity:** Balance remaining in the scheme is returned to the investors upon its maturity on the basis of the Net Assets Value of the scheme on that date.

Role of Mutual Fund in Financial Market:

- i) **Organized Investments:** Due to participation of Mutual Funds in a large scale, it has transformed the Financial Market Transactions into a much more organized. Individual investors may speculate to the maximum, but under the collective investment scheme (i.e. Mutual Fund), the tendency to speculate greatly reduced at an individual level.
- ii) **Evolution of Stock Markets:** Large scale transactions entered into by Mutual Funds, headed by a team professionals, have helped in the evolution of stock markets and financial markets.
- iii) **Household Savings:** They are the ideal route for many a household to invest their savings for a higher returns, than normal term deposits with banks.

The advantages of investing in Mutual Funds:

- i) **Professional Management:** Investors avail the services of experienced and skilled professionals who are backed by a dedicated investment research team which analyses the performance and prospects of companies and selects suitable investments to achieve the objectives of the scheme.
- ii) **Diversification:** MFs invest in a number of companies across a broad cross-section of industries and sectors. Investors achieve this diversification through a MF with less money and risk.
- iii) **Convenient Administration:** Investing in a MF reduces paper work and helps investors to avoid many problems such as bad deliveries, delayed payments and unnecessary follow up with brokers and companies.
- iv) **Return Potential:** Over a medium to long term, MF has the potential to provide a higher return as they invest in a diversified basket of selected securities.
- v) **Low Costs:** MFs are a relatively less expensive way to invest compared to directly investing in the capital markets because the benefits of scale in brokerage, custodial & other fees translate into lower costs for investors.
- vi) **Liquidity:** In open ended schemes, investors can get their money back promptly at Net Asset Value (NAV) related prices from the Mutual Fund. With close-ended schemes, investors can sell their units on a stock exchange at the prevailing market price, or avail of the facility of direct repurchase at NAV related prices which some close ended and interval schemes offer periodically.
- vii) **Transparency:** Investors get regular information on the value of their investment in addition to disclosure on the specific investments made by scheme, the proportion invested in each class of assets and the Fund Manager's investment strategy and outlook.

Limitations of taking the Mutual Fund route for investment:

- i) **No Choice of Securities:** Investors cannot choose the securities which they want to invest in.

ii) Relying on Other's Performance:

- ❖ Investors face the risk of Fund Manager not performing well. Investors in Mutual Fund have to rely on the Fund Manager for receiving any earning made by the fund, i.e. they are not automatic.
- ❖ If Fund Manager's pay is linked to performance of the fund, he may be tempted to perform only on short-term and neglect long-term performance of the fund.

iii) High Management Fee: The Management Fees charged by the fund reduces the return available to the investors.

iv) Diversification: Diversification minimizes risk but does not guarantee higher return.

v) Diversion of Funds: There may be unethical practices e.g. diversion of Mutual Fund amounts by Mutual Fund /s to their sister concerns for making gains for them.

vi) Lock-In Period: Many MF schemes are subject to lock in period and therefore, deny the investors market drawn benefits.

Functions of Asset Management Company and The Statutory Requirements for a Company to be Registered as AMC:

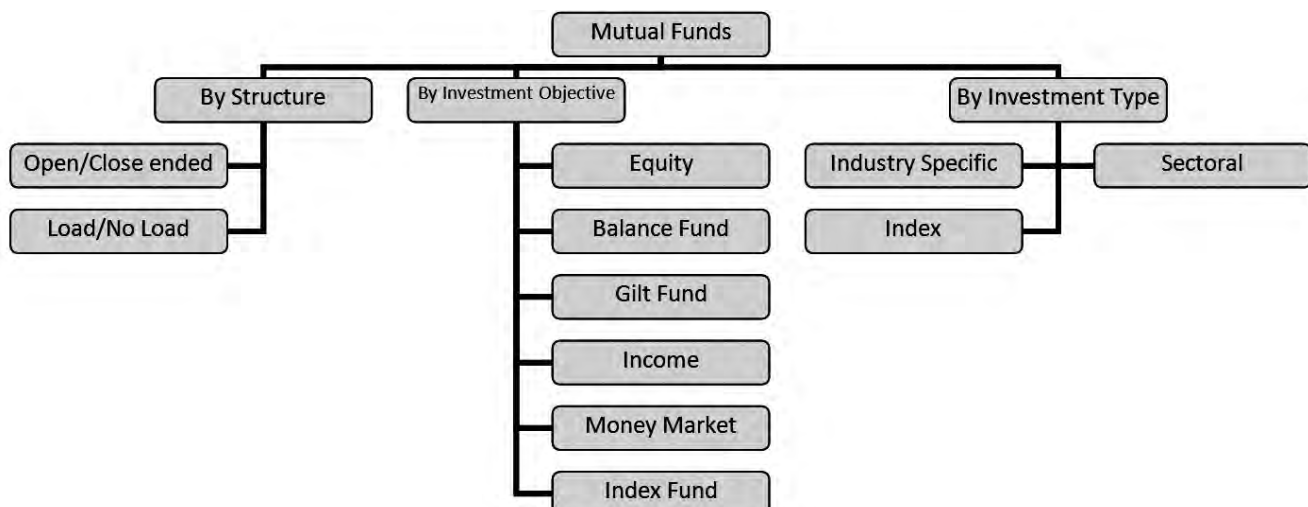
A. Functions:

- i) **Operations:** Asset Management Company (AMC) manages the affairs of the Mutual Fund in relation to the operation of Mutual Fund schemes. The Asset Management Company is a key link in the success of the scheme and the interests of the unit holders.
- ii) **Records:** It is expected to maintain a record in support of each investment decision.

B. Statutory Requirements:

- i) **SEBI Approval:** AMC should be approved by SEBI and cannot be changed, except unless by a majority of the trustees or by 75% of the unit-holders.
- ii) **Other Conditions:**
 - ❖ AMC's Directors should be persons of standing and suitable professionals.
 - ❖ Chairman of the AMC should not be the trustee of any Mutual Fund.
 - ❖ AMC should have a minimum Net Worth of ₹10 Crores.

Different types of Mutual Fund schemes



Now the different Types of Mutual Fund Schemes are detailed as under:

(A) By Structure

I. Open End and Closed End Funds:

Aspect	Open End Funds	Closed End Funds
Initial Subscription	Open-End Fund is one which is available for subscription all through the year.	Fund is open for subscription only during a specified period.
Maturity	Do not have a fixed maturity.	Stipulated maturity period (3 to 15 Years)
Subsequent Transactions	Investors can buy and sell units at Net Asset Value related prices.	Investors can invest at the time of the initial public issue and thereafter they can buy or sell the units of the scheme on the stock exchanges where they are listed.
Repurchase	Any time.	Based on terms of the fund. Periodic repurchase at NAV related price.

Interval Funds: Interval funds combine the features of open-ended and close ended schemes. They are open for sale or redemption during pre-determined intervals at NAV related prices.

II. Load Funds and No-Load Funds:

(a) **Load Funds:** MF can recover the initial marketing expenses (loads) in any of the following ways

- **Entry Load:** Deducting these expenses at the joining time (suitably adding to the existing NAV, thus allotting less units).
- **Deferred Load:** By deducting deferred load, where the expenses are charged over a specified period.
- **Exit Load:** By deducting these expense when investors exit the scheme (suitable reducing from the existing NAV while making payment)

(b) **No Load Funds:** Investor in a No-Load fund enters and exits the fund at the NAV, i.e. they do not bear the initial marketing expenses.

Note: Load / No—Load Funds are differentiated on the basis of initial marketing expenses and not on the basis of other running/ management expenses.

(B) By Investment Objectives:

(I) Growth Funds:

- (a) **Object:** To provide capital appreciation over the medium to long term.
- (b) **Investment Pattern:** Such schemes invest a majority of their corpus in equities. It has been proved that returns from stocks, have outperformed most other kind of investments held over the long term.
- (c) **For Whom?** Growth Schemes are meant for investors who have a long-term outlook, and seek growth over a period.

(II) Income Funds:

- (a) **Object:** To provide regular and steady income to investors.
- (b) **Investment Pattern:** Fixed income securities such as Bond, Corporate Debentures and Government Securities.

(c) **For Whom?** Income Funds are ideal for capital stability and regular income.

(d) **Variants:**

- **Gilt Fund:** Fund that invests its proceeds only in Government Securities and Treasury Bills.
- **Bond Fund:** Fund that invests its proceeds only in Bonds and Corporate Debt Instruments.

(III) **Balance Funds:**

- (a) **Object:** Provide both growth and regular income. Such schemes periodically distribute a part of their earning.
- (b) **Investment Pattern:** Both in Equities and Fixed Income Securities, in the proportion indicated in their offer documents.
- (c) **For Whom?** For investors looking for a combination of income and moderate growth.
- (d) **Less Sensitive to Market Movements:** In a rising stock market, the NAV of these schemes may not normally keep pace, or fall equally when the market falls.

(IV) **Money Market Funds:**

- (a) **Object:** Provide easy liquidity, preservation of capital and moderate income.
- (b) **Investment Pattern:** Safer Short-Term Instruments such as Treasury Bills, Certificates of Deposit, Commercial Paper and Inter-Bank Call Money. Returns on these schemes may fluctuate depending upon the interest rates prevailing in the market.
- (c) **For Whom?** For corporate and individual investors, who wish to invest their surplus funds for short period.

(V) **Tax Saving Schemes:**

- (a) **Object:** Provide tax rebates to the investors under specific provisions of the Indian Income Tax laws as the Government offers tax incentives for investment in specified avenues.
- (b) **For Whom?** For persons who seek to park their otherwise taxable income in funds for a moderate income, to reduce their tax liability.

(VI) **BY INVESTMENT TYPES:**

- a) **Industry Specific Schemes:** Industry-Specific Schemes invest only in the industries specified in the offer document. The investment of these fund is limited to specific industries like Infotech, FMCG, Pharmaceuticals, etc.
- b) **Index Schemes:** Index Funds attempt to replicate the performance of a particular index such as the BSE Sensex or the NSE 50
- c) **Sectoral Schemes:** Invest exclusively in a specified sector. This could be an industry or a group of industries or various segments such as "A" Group shares or initial public offerings.

An overview of new types of Mutual Funds that are in vogue today:

(A) **Exchange Traded Fund (ETF) :**

- (i) **Nature:** An ETF is a hybrid product having features of both an Open-Ended Mutual Fund and an exchange-listed security. It is a fund that tracks an index, but can be traded like a stock.
- (ii) **Scheme/Structure:** In this type of fund, money is invested in the stocks of the index in the same proportion. ETF are traded on stock exchanges, and hence can be traded any time during the day.
- (iii) **Features:**
 - ❖ Prices fluctuate from moment to moment. The difference in price is due to the forces of demand and supply for ETF in the market at that point of time.



- ❖ Investor needs a broker to purchase units of ETF.
- ❖ They have very low operating and transaction costs, since there are no loads or investment minimums required to purchase and ETF.
- ❖ ETFs can be traded any time during the day, as against conventional index funds which can be traded only at the end of the day.
- ❖ ETF units can be traded at a premium or discount to the underlying Net Asset Value.

(B) Fund of Funds:

- (i) **Nature:** It is a Mutual Fund Scheme, where the subscription proceeds are invested in other Mutual Funds, instead of investing in Equity or Debt Instruments.
- (ii) **Features:**
 - ❖ These funds offer and achieve a greater diversification than traditional mutual funds.
 - ❖ Expense/Fees on such funds are higher than those on regular funds because they include part of the expense fees charged by the underlying funds.
 - ❖ Indirectly, the proceeds of Fund of Funds may be invested in its own funds, and can be difficult to keep track of overall holdings.

(C) Systematic Withdrawal Plan (SWP):

- (i) **Nature:** SWP permits the investor to make an investment at one go and systematically withdraw at periodic intervals, at the same time permitting the balance funds to be re-invested.
- (ii) **Features:**
 - ❖ Investors can receive regular income while still maintaining their investment's growth potential.
 - ❖ SWP includes convenient payout options and has several tax advantages.
 - ❖ Withdrawal can be done either on a monthly basis or on a quarterly basis, based on needs and investment goals of an investor.
 - ❖ Tax is not deducted, & dividend distribution tax is not applicable. There are no entry or exit loads.

(D) Systematic Investment Plan (SIP):

- (i) **Nature:** Under a SIP, an investor can invest in the units of Mutual Funds at periodic intervals (monthly or quarterly) prevailing unit price of that time. This fund is for those investors who do not want to accumulate their savings and invest in one go. This fund permits them to accumulate their savings by directly investing in the mutual fund.
- (ii) **Feature:** Investors can save a fixed amount of rupees every month or quarter, for the purchase of additional units.

Factors Affecting selection of Mutual Funds:

- 1) **Past Performance:** The Net Asset Value is the yardstick for evaluating a Mutual Fund. An increase in NAV means a capital appreciation of the investor. While evaluating the performance of the fund, the dividends distributed is to be considered as the same signifies income to the investor. Dividends distributed during a period go on to reduce the Net Asset Value of the fund to the extent of such distribution.
- 2) **Timing:** The timing when the mutual fund is raising money from the market is vital. In a bullish market, investment in mutual fund falls significantly in value whereas in a bearish market, it is the other way round where it registers growth.

- 3) **Size of Fund:** Managing a small sized fund and managing a large sized fund is not the same as it is not dependent on the product of numbers. Purchase through large sized fund may by itself push prices up while sale may push prices down. Medium sized funds are generally preferred.
- 4) **Age of Fund:** Longevity of the fund in business needs to be determined and its performance in rising, falling and steady markets have to be checked for consistency.
- 5) **Largest Holding:** It is important to note where the largest holdings in mutual fund have been invested in order to identify diversion of funds to Group Concerns.
- 6) **Fund Manager:** One should have an idea of the person handling the fund management. A person of repute gives confidence to the investors. His performance across varying market scenarios should also be evaluated.
- 7) **Expense Ratio:** SEBI has laid down the upper ceiling for Expense Ratio. A lower Expense Ratio will give a higher return which is better for an investor.
- 8) **PE Ratio:** The ratio indicates the weighted average PE Ratio of the stocks that constitute the fund portfolio with weights being given to the market value of holdings. It helps to identify the risk levels in which the mutual fund operates.
- 9) **Portfolio Turnover:** The fund manager decides as to when he should enter or quit the market. A very low portfolio turnover indicates that he is neither entering nor quitting the market very frequently. A high ratio, on the other hand, may suggest that too frequent moves have lead the fund manager to miss out on the next big wave of investments. A simple average of the portfolio turnover ratio of a peer group updated by mutual fund tracking agencies may serve as a benchmark. The ratio is annual purchase plus annual sale to average value of the portfolio.

Poorly Performing Fund used as Exit Criteria:

- 1) When the mutual fund consistently under performs the broad based index, it is high time, that it should get out of the scheme. It would be better to invest in the index itself either by investing in the constituents of the index or by buying into an index fund.
- 2) When the mutual fund consistently under performs its peer group instead of it being at the top. In such a case, it would have to pay to get out of the scheme and then invest in the winning schemes.
- 3) When the mutual fund changes its objectives e.g. instead of providing a regular income to the investor, the composition of the portfolio has changed to a growth fund mode which is not in tune with the investor's risk preferences.
- 4) When the investor changes his objective of investing in a mutual fund which no longer is beneficial to him.
- 5) When the fund manager, handling the mutual fund schemes, has been replaced by a new entrant whose image is not known.

Establishment of a Mutual Fund:

- 1) **SEBI Regulations:** Mutual Funds should be registered with SEBI, for collecting funds from the public. Mutual Funds are governed by SEBI Regulations, are subject to monitoring and inspection by SEBI.
- 2) **Sponsor:**
 - (a) **Meaning:** Sponsor is a Body Corporate who establishes a Mutual Fund after completing the formalities prescribed in the SEBI's Mutual Fund Regulations. A Mutual Fund has to be established through the medium of a sponsor.



(b) Conditions:

- ❖ Sponsor should have a sound track record and general reputation of fairness and integrity in all its business transactions.
- ❖ Sponsor should contribute at least 40% to the Net Worth of the Asset Management Company.
- ❖ A Deed shall be executed by the Sponsor, in favour of the trustees named in the instrument of trust.

3) Trust:

- (a) Constitution:** Mutual Fund should be established as either a Trustee Company or a Trust, under the Indian Trust Act and the instrument of trust shall be in the form of a deed.
- (b) Registration:** The Trust Deed shall be duly registered under the provisions of the Indian Registration Act, 1908.
- (c) Contents:** Deed should contain the clauses specified in the Third Schedule of SEBI Regulations.

Restrictions and Conditions for investments by Mutual Funds:

- I) Inter-Scheme Transfer:** Transfers of Investments from one scheme to another scheme in the same Mutual Fund will be allowed only if—
 - (a) Market Price:** Transfers are done at prevailing market price for quoted instruments on spot basis.
 - (b) Investment Objective:** Securities transferred should be in conformity with the investment objective of the scheme to which such transfer has been made.
- II) Fees for Investment:** A Scheme can invest in another scheme — (a) under the same AMC, (b) other Mutual Fund, without charging any fees.
- III) Issue Expenses:** Initial Issue Expenses of any scheme should not exceed 6% of funds raised there under.
- IV) Delivery Based Transactions:**
 - a) Delivery:** Mutual Fund should buy and sell securities only on the basis of deliveries. It should take, delivery of the securities for purchases, and deliver the securities in case of sale.
 - b) Prohibition:** Purchase and sale should not result in a position where the Mutual Fund has to make short sale or carry forward transaction.
 - c) Derivative Transaction:** Mutual Funds can enter into Derivatives Transactions in a Recognized Stock Exchange for the purpose of hedging and portfolio balancing, in accordance with the guidelines issued by SEBI.
- V) Title:** Every MF should get the securities purchased or transferred in the name of Mutual Fund on account of the concerned scheme, wherever investments are intended to be of long-term nature.
- VI) Bank Deposits:** Pending deployment of funds of a scheme as per the investment objective, Mutual Funds can invest the same in Short-term Deposits of Scheduled Commercial Banks.
- VII) Restriction on Investments:** Investments made by Mutual Funds should confirm to the following limits :

Instrument / Investment in	Quantum of Investment and
(a) Debt instruments of a single issuer and Mortgaged backed Securitised Debt	❖ 15% of NAV of the Scheme ❖ 20% with approval of Board of Trustees and AMC ❖ Govt. Securities and Money Market ❖ Instruments.
(b) Unrated Debt Instruments (Approval of Board of Trustees and AMC required)	❖ Individually (for each issuer) - 10% of NAV of Scheme ❖ Aggregate Investment - 25% of the NAV of Scheme
(c) Share Capital of a Company	❖ 10% of the Company's Paid Up Capital.
(d) Scheme under the same AMC or other Mutual Fund under the same management or schemes of other AMC	❖ 5% of the NAV of the Mutual Fund.
(e) Equity Shares or Equity Related instruments of a Company	❖ 10% of the NAV of the Scheme ❖ Not applicable to investments in index fund or sector or industry specific scheme
(f) Unlisted Equity Shares/Equity Related instrument	❖ 5% of the NAV of the scheme
— Open Ended Scheme	❖ 10% of the NAV of the scheme
— Close Ended Scheme	

VIII) Prohibited Investments: A Mutual Fund should not invest in -

- (a) any unlisted security of an Associate or Group Company of the Sponsor,
- (b) any security issued by way of private placement by an Associate or Group Company of the Sponsor,
- (c) listed securities of Group Companies of the Sponsor which is in excess of 25% of the Net Assets,
- (d) any Fund of a Fund Scheme.

Net asset value in relation to a Mutual Fund:

Net Asset Value (NAV) of a Mutual Fund (MF) Scheme is the Market Value per unit of all the assets of the scheme. It is the value of each unit of the scheme. It includes dividends, interest accruals and reduction of liabilities and expenses.

(A) Ascertainment:

- (i) The investors' subscription is treated as the capital in the Balance Sheet of the Fund, and the investments on their behalf are treated as assets.
- (ii) $\text{NAV per Unit} = \text{Net Asset Value of the Fund} \div \text{No. of Units Outstanding}$.
- (iii) It reflects the realizable value that the investor will get for each unit that he is holding if the scheme is liquidated on that date.
- (iv) $\text{Net Assets} = \text{Market Value of Investments} + \text{Receivables} + \text{Accrued Income} + \text{Other Assets} - \text{Accrued Expenses} - \text{Payables} - \text{Other Liabilities}$

(B) Utility:

- (i) The performance of a particular scheme of a mutual fund is denoted by NAV.
- (ii) NAV plays an important part in investors' decisions to enter or to exit the Scheme.



- (iii) Analysts use the NAV to determine the yield on the schemes.

Investors' Rights & Obligations under the Mutual Fund Regulations:

(A) Rights:

- (i) Unit holder has proportionate right in the beneficial ownership of the scheme assets, as well as any dividend or income declared under the scheme.
- (ii) Unit holder is entitled to receive dividend warrant within 42 days.
- (iii) AMC can be terminated by 75% of the unit holders.
- (iv) Unit Holder has the right to inspect major documents i.e. material contracts, Memorandum of Association and Articles of Association of the AMC, Offer Document, etc.
- (v) 75% of the unit holders have the right to approve any changes in the close-ended scheme.
- (vi) Every unit holder have right to receive copy of the annual statement.

(B) Limitations to Investors' Rights:

- (i) **No right against Trust:** Unit holders cannot sue the Trust, but they can initiate proceedings against the Trustees, if they feel that they are being cheated.
- (ii) **No right to sue for lower returns:** Except in certain circumstances, AMC cannot assure a specified level of return to the investors. AMC cannot be sued to make good any shortfall in such schemes.

(C) Investors' Obligations:

- (i) **Study of risk factors:** An investor should carefully study the risk factors and other information provided in the Offer Document. Failure to study will not entitle him for any rights thereafter.
- (ii) **Monitoring schemes:** It is the responsibility of the investor to monitor his schemes, by studying the Reports and other Financial Statements of the Funds.

The steps taken for improvement and compliance of standards of Mutual Fund:

(A) Disclosure of Schemes:

- (i) **Disclosure:** Mutual Funds should disclose the full portfolio of their schemes in the annual report within 1 month of the close of each financial year.
- (ii) **Mode of Disclosure:** Mutual Fund should either send it to each unit holder or publish it by way of an advertisement in one english daily and one in regional language.

(B) Committee:

- (i) AMC should prepare a compliance manual and design internal audit systems, before the launch of any schemes.
- (ii) The Trustees should constitute an Audit Committee, which will review the internal audit systems and the recommendation of the internal and statutory audit reports and ensure their rectification.

(D) Valuation Committee: The AMC shall constitute an in-house valuation committee consisting of senior executives including personnel from accounts, fund management and compliance departments. The Committee would review the system practice of valuation of securities on a regular basis.

(E) Transactions with Associates: The Trustees shall review all transactions of the Mutual Fund with the associates, on a regular basis.

Trustees with regard to setting up of a Mutual Fund and their eligibility for appointment:

- (A) Meaning:** Trustees means Board of Trustees or the Trustee Company who hold the property of the Mutual Fund in trust, for the benefit of the unit holders.
- (B) Regulations:** Mutual Fund shall appoint trustees in accordance with Mutual Fund regulations.
- (C) Eligibility Conditions:** A person can be appointed as a Trustee, only if he—
 - (a) is a person of ability, integrity and standing,
 - (b) Has not been found guilty of moral turpitude, and
 - (c) Has not been convicted of any economic offence or violation of any securities laws, and
 - (d) Has furnished the required particulars and information.
- (D) Not Eligible for appointment as Trustee:**
 - (a) Asset Management Company
 - (b) Officers or Employees of AMC
- (E) Restriction on Further Appointment:** A person who is appointed as a Trustee of a Mutual fund, cannot be appointed as a Trustee of any other Mutual Fund unless —
 - a) He is an independent trustee.
 - b) Prior approval of the Mutual Fund of which he is a trustee has been obtained for such an appointment.
- (F) Independent Trustees:** Atleast 2/3rd of the trustees should be independent persons and shall not be associated with the sponsors or be associated with them in any manner whatsoever.
- (G) Company as Trustee:** In case a Company is appointed as a Trustee, then its Directors can act as trustees of any other trust, provided that the object of the trust is not in conflict with the object of the Mutual Fund.

Rights and Obligations of the Trustees of a Mutual Fund, with reference to the operations of the Trust and the decisions they can take with reference to a fund:

- 1) Agreement:** Trustees and the AMC should enter into an Investment Management Agreement. The Trustees have a right to obtain all information considered necessary from the AMC.
- 2) Obligations before Launch of Scheme:** Before the launch of any new scheme, the Trustees should ensure that the AMC has —
 - i) Proper infrastructure for handling the data, records, and to take care of accounting and dealing room requirements.
 - ii) Appointed all key personnel including Fund Manager, and submitted. their bio-data with the Trustees, within 45 days of their appointment.
 - iii) Appointed Auditors to audit its accounts.
 - iv) Appointed a Compliance Officer, for compliance with regulatory requirement and to redress investor grievances.
 - v) Appointed registrars and laid down parameters for their supervision.
 - vi) Prepared a Compliance Manual & designed internal control mechanisms including internal audit systems.
 - vii) Specified norms for empanelment of Brokers and Marketing Agents.



- 3) Diligence and Integrity of AMC:** Trustees should ensure that the AMC —
- i) Has been diligent in empanelling the brokers, in monitoring securities transactions with brokers and avoiding undue concentration of business with any brokers.
 - ii) Has not given any undue or unfair advantage to any associates or dealt with any of the associates of the AMC in any manner detrimental to interest of the unit holders.
 - iii) Has entered into transactions in accordance with SEBI regulations and the scheme and the Trust Deed.
 - iv) Has been managing the Mutual Fund Schemes independently of other activities, and have taken adequate steps to ensure that the interest of investors of one scheme are not being compromised with those of any other scheme or of other activities of the AMC.
- 4) Intimation to SEBI:** If the Trustees believe that Mutual Fund Scheme is not being conducted in accordance with regulations, they should immediately inform SEBI of the violation and the action taken by them.
- 5) Submission of Details:** Each Trustee should file details of his transactions of dealing in securities with the Mutual Fund on a quarterly basis.
- 6) Custodian of Assets:** Trustees are accountable for and are the custodian of, the funds and property of the respective schemes.
- 7) Calling for Information:** Trustees should call for the details of transactions in securities by the key personnel of the AMC in his own name/on behalf of the AMC & should report to SEBI, as & when required.
- 8) Review Activities:** Trustees should review
- i) **Related Party Transactions:** All transactions carried out between the Mutual Funds, AMC & its associates.
 - ii) **Net Worth:** Net Worth of the AMC and in case of any shortfall, ensure that the AMC make up for the shortfall as per SEBI Regulations.
 - iii) **Service Contracts:** All service contracts such as custody arrangements, transfer agency of the securities and satisfy itself that such contracts are executed in the interest of the unit holders.
 - iv) **Investor Complaints:** Investor complaints received and the redressal of the same.
- 9) No Conflict of Interest:** Trustees should ensure that there are no conflict of interest between the manner of deployment of its Net worth by the AMC and the interest of the unit holders.
- 10) Furnishing of Information to SEBI:** Trustees should furnish to the SEBI on a half yearly basis-
- i) **Activity Report:** Report on the activities of the Mutual Fund.
 - ii) **Certificate on Transaction by Related Parties:** Certificate stating that the Trustees have satisfied themselves that there have been no instances of self dealing or front running by any of the Trustees, directors and key personnel of the AMC.
 - iii) **Certificate on Management of Fund:** Certificate that the AMC has been managing the schemes independently of any other activities, by ensuring that the interest of the unit holders are protected.
- 11) Consent of Unit holders:** The trustees shall obtain the consent of the unit holders when —
- i) Required to do so by the Board in the interest of the unit holders; or
 - ii) Required to do so on the requisition made by 3/4^{ths} of the unit holders of any scheme; or

- iii) When the majority of the trustees decide to wind up or prematurely redeem the units; or
- iv) When any change in the fundamental attributes of any scheme or the trust or fees and expenses payable or any other change which would modify the scheme or affect the interest of the unit holders is proposed to be carried out unless the consent of not less than 3/4th of the unit holders is obtained.

Criteria for appointment of AMC and other conditions to be satisfied by an AMC:

(A) Eligibility Criterion:

(i) Financial Performance:

- ❖ Sound Track Record (Net Worth and Profitability), good reputation and fairness in transaction.
- ❖ Minimum Net Worth = ₹10 Crores.

(ii) Directors / Key Personnel

- ❖ **Qualification and Experience:** Directors of AMC to have adequate professional experience in finance and financial services related field.
- ❖ **Clean Records:** Should not have been found guilty of moral turpitude or convicted of any economic offence or violation of any securities laws / economic laws.
- ❖ **Previous Employment:** They should not have worked for any AMC / Mutual Fund / Intermediary during the period when such AMC / MF / Intermediary were suspended by SEBI.

(iii) Independent Directors: Board of Directors of AMC to have atleast 50% Independent Directors, i.e. not associated with, the sponsor or any of its subsidiaries or the Trustees.

(iv) Chairman: Chairman of the AMC should not be Trustee of any Mutual Fund.

(B) Other Terms and Conditions: Approval granted shall be subject to the following conditions —

- (i) Restriction on Directorship:** Director of the AMC shall not be Director in another AMC. Independent Directors are excluded from this restriction.
- (ii) Furnishing of Particulars:** In case of any material change in the information/ particulars previously furnished, AMC should immediately inform the SEBI.
- (iii) Appointment of Directors:** Appointment of Director of an AMC will require the prior approval of the Trustees.
- (iv) Compliance with Regulations:** AMC should comply with SEBI Regulations.
- (v) Change in Controlling Interest:** Change in controlling interest of the AMC will require the prior approval of Trustees, SEBI and the Unit Holders.
- (vi) Furnishing of Documents / Information to Trustees:** AMC should furnish information and documents to the Trustees as and when required by the Trustees.

(C) Restriction on Activities of AMC:

- (i) Not to be Trustee:** AMC should not act as a Trustee of any Mutual Fund.
- (ii) Business Activities:** Without the approval of SEBI, an AMC cannot undertake any other business activities except :-
 - ❖ Portfolio Management Services,
 - ❖ Management and advisory services to Offshore Funds, Pension Funds, Provident Funds, Venture Capital Funds, etc.



- (iii) **Not to Invest in Schemes:** AMC should not invest in any of its schemes, unless full disclosure of such intention has been made in the offer document.

Duties and obligations of an AMC with reference to management of Mutual Fund Scheme:

- 1) **Regulations:** AMC should ensure that the Scheme Funds are invested only in accordance with SEBI Regulations and the Trust Deed.
- 2) **Investment Decisions:** It should take all its investment decisions with care and diligence, in the same manner as any other person in the same business would have taken.
 - (a) **Liability for Acts of Persons:** AMC is responsible for the acts of commission or omissions by its Employees, or
 - (b) Persons whose services have been procured by the AMC.
- 3) **Non-Exclusion from Liability:** AMC or its Directors or other Officers shall not be absolved of liability to the Mutual Fund for their acts of commission or omission, while holding such position or office.
- 4) **Activity Report to Trustees:** AMC should submit a report on its activities and the compliance with the SEBI regulations. Such a report should be furnished every quarter.
- 5) **Related Party Transaction:**
 - (a) AMC should not utilize the services of the — (i) Sponsor, or (ii) any of its Associates, or (iii) Employees or their relatives, for any securities transaction and distribution and sale of securities without proper disclosure.
 - (b) Report to SEBI/Trustees: Transactions entered into with any of the associates should be reported to SEBI and the Board of Trustees.
 - (c) Transactions by Key-Management Personnel: AMC should furnish the details of transactions in securities by the key personnel of the AMC in their own name or on behalf of the AMC and shall also report to SEBI, as and when required by SEBI.
- 6) **Large Investor Particulars:**
 - (a) **Situation:** Company has invested more than 5% of the NAV of a Scheme.
 - (b) **Reportable Information:** Investment made by the Mutual Fund in that Company/ Subsidiaries.
 - (c) **Reporting and Disclosure:** The above information should be brought to the notice of the Trustees by the AMC, and disclosed in the half yearly and annual accounts of the respective schemes.
- 7) **Personnel Related Information:** Detailed bio-data of all its Directors along with their interest in other Companies, within 15 days of their appointment, should be submitted to the Trustees.
- 8) **Restriction on Appointment of Personnel:** AMC should not appoint any person as key personnel who has been found guilty of any economic offence or involved in violation of securities laws.
- 9) **Appointment of Registrar/Agents:** AMC shall appoint Registrars and Share Transfer Agents who are registered with SEBI.

Regulatory requirements with regard to Money Market Funds and the issues that act as hurdles for the success of Money Market Mutual Funds:

- 1) **Regulatory Framework:** Instructions based on recommendations of the Task force constituted under the chairmanship of Shri D. Basu on MMMFs were as follows -
 - (a) No minimum amount of investments prescribed.
 - (b) Minimum lock-in-period is 46 days.

- (c) Minimum of 25 percent of funds (20 percent earlier) shall be invested in treasury bills and dated Government securities having an unexpired maturity upto one year.
- (d) Maximum of 30 percent of funds (20 percent earlier) shall be diverted to call money market.
- (e) Investment in Commercial Papers restricted to 15 percent.
- (f) Maximum of 20 percent of funds may be invested in commercial transactions and accepted/co-accepted by banks.
- (g) Investments in Capital Market Instruments have been barred so as to avoid undue risks.
- (h) Borrowing and Lending between schemes of the Money Market Mutual Funds and between sponsoring bank and the Money Market Mutual Funds are also prohibited. Switching of assets between Schemes will have to be at market rates and based on conscious investment decisions.

2) Regulatory impediments for the success of Money Market Funds:

- (a) The Lock-in period hampers the liquidity of the fund. Money Market Fund should ideally operate like a savings account.
- (b) Investors expect to get more than what they would get on bank fixed deposits. Considering the administrative expenses involved, the yield on Money Market Funds should be relatively higher.
- (c) Retail investors have to be educated about Money Market Funds. A huge network is needed to target such investors.
- (d) A large corpus is needed to deal in the money market on a consistent basis.
- (e) No regulatory body has been determined.

Methods for evaluating the performance of Mutual Fund:

1) Sharpe Ratio:

- a) **Nature:** Sharpe Ratio is a composite measure to evaluate the performance of Mutual Funds by comparing the reward to risk ratio of different funds. This formula uses the volatility of portfolio return.
- b) **Basis:** The reward, i.e. portfolio return in excess of the average risk free rate of return, is divided by standard deviation. Since it considers standard deviation as a measure of risk, it takes into account both Systematic and Unsystematic Risk.
- c) **Risk Premium:** This measure indicates the risk premium return per unit of total risk. Excess return earned over the risk free return on portfolio to the portfolio's total risk measured by the standard deviation.

d) Computation:

$$\text{Sharpe Ratio} = (R_p - R_f) \div \sigma_p$$

Where,

R_p = Return on Portfolio

R_f = Risk Free Return

σ_p = Standard Deviation of Portfolio

- e) **Use:** Sharpe Ratio is an appropriate measure of performance for an overall portfolio when it is compared with another portfolio. The result on its own cannot lead to any comparison. It has to be compared with returns from other portfolio for making any meaningful conclusion.



2) Treynor's Ratio:Nature: Treynor Ratio is a measure to evaluate the performance of mutual funds by comparing the reward to volatility ratio of different funds. Risk considered here is only Systematic Risk, and not Total Risk.

- a) Assumption:** It assumes a completely diversified portfolio, i.e. that the investor would have eliminated all the unsystematic risk by holding a diversified portfolio.
- b) Basis:** Excess return earned over the risk free return on portfolio to the portfolio's total risk measured by the Beta of Portfolio. The ratio expresses the portfolio's risk premium per unit of beta.

c) Computation:

$$\text{Treynor's Ratio} = (R_p - R_F) \div \beta_p$$

Where, R_p = Return on Portfolio

R_F = Risk Free Return

β_p = Beta of Portfolio

- d) Use:** It is appropriate only in case of comparison with completely diversified portfolio. As in the case of Sharpe Ratio, Treynor's measure cannot be used in an isolated manner. It should be compared with such results of other portfolio to draw conclusions.

3) Jensen's Alpha:

(a) Nature: It is an absolute measure of evaluating a funds performance. It compares with desired performance (based on benchmark portfolio) with actual performance.

(b) Benchmark Performance: Benchmark Performance is computed using Capital Asset Pricing Model (CAPM), i.e. by factoring the sensitivity of the portfolio return to that the Market Portfolio.

(c) Computation:

Jensen's Alpha [a] = Actual Return Less Return under CAPM

(d) Evaluation and Appropriateness:

- If Jensen's Alpha is positive, it reflects that the Mutual Fund has exceeded the expectations and outperformed the Market Portfolio and vice-versa.
- Alpha would give meaningful results only if its used to compare two portfolios of similar beta factors.
- It is used for measuring performance of a portfolio and to identify the part of the performance that can be attributed solely to the portfolio.
- This model considers only systematic risk and not the total risk.

Different kinds of expenditure incurred by a Mutual Fund and the way to treat them in computing the net asset value:

(A) Initial Issue Expenses: AMC incur some expenses when a scheme is launched. The benefits of these expenses accrue over many years. Therefore, they cannot be charged to any single year. SEBI permits amortization of initial expenses as follows —

- i. **Close End Scheme:** Such schemes floated on a load basis, the initial issue expense shall be amortized on a weekly basis over the period of the scheme.
- ii. **Open Ended Scheme:** Initial issue expenses may be amortized over a period not exceeding 5 years. Issue expenses incurred during the life of an open end scheme cannot be amortized.

(B) Recurring Expenses: It includes the followings :-

(i) Marketing and selling expenses including Agent's Commission.	(i) Cost of fund transfers from location to location.
(ii) Brokerage and Transaction Costs.	(ii) Cost of providing accounts statements and dividend / redemption cheques and warrants.
(iii) Registrar Services for transfer of units sold or redeemed.	(iii) Insurance Premium paid by the Fund.
(iv) Audit Fees.	(iv) Winding up costs for terminating a fund or a scheme.
(v) Custodian Charges.	(v) Costs of Statutory Advertisements.
(vi) Costs related to investor communication.	(vi) Other costs as approved by SEBI.

(C) Total Expenses: Total Expenses of the scheme as charged by the AMC excluding issue or redemption expenses but including investment management and advisory fees, are subject to the following limits-

- (i) On the first ₹100 Crores of the average weekly Net Assets - 1.5%
- (ii) On the next ₹300 Crores of the average weekly Net Assets - 2.25%
- (iii) On the next ₹300 Crores of the average weekly Net Assets - 2.0%
- (iv) On the balance of the assets 1.75%

Value of Traded Securities and Non-Traded Securities of Mutual Fund:**1) Traded Securities:**

- (a) Last Quoted Closing Price:** Traded Securities should be valued at the last quoted closing price on the Stock Exchange.
- (b) More than One Stock Exchange:** If the securities are traded on more than one Stock Exchange than the valuation should be as per the last quoted closing price on the Stock Exchange where the security is principally traded.
- (c) No Trading on Principal Stock Exchange:** When on a particular valuation day, a security has not been traded on the selected Stock Exchange, the value at which it is traded on another Stock Exchange may be used.

2) Non-Traded Securities:

- (a) Meaning:** If a security is not traded on any Stock Exchange for a period of 60 days prior to the valuation date, the scrip must be valued as a non-trade scrip.
- (b) Valuation:** Non-Traded Scrips should be valued in good faith by the AMC on the basis of valuation methods approved by the AMC.
- (c) General Principles in Valuation:**
 - ❖ **Equity Instruments:** Valued on the basis of capitalization of earnings solely or in combination with the Net Asset Value. Price Earning Ratios of comparable traded securities, with an appropriate discount for lower liquidity, should be used for the purpose of capitalization.
 - ❖ **Debt Instruments:** Valued on YTM (Yield to Maturity) basis. Capitalization factor being determined for comparable traded securities with an appropriate discount for lower liquidity.
 - ❖ **Government Securities:** Valued at YTM based on the prevailing market rate.
 - ❖ **Money Market Instruments:** Valued at Cost Plus Accruals.



- ❖ **Convertible Debentures/Bonds:** Non-convertible component should be valued as a debt Instrument, and Convertibles as any Equity Instrument.

Computation of the Time Weighted and Rupee Weighted Rate of Return:

1) Total Return (Investors' Perspective):

Total Return = Distributions + Capital Appreciation

NAV at the beginning of the period

Where, Distributions = Dividend Distribution or Capital Distribution

Capital Appreciation = Closing NAV Less Opening NAV

2) Time Weighted Rate of Return (TWROR):

- (a) It is the rate of return earned per rupee invested over a period of time. It eliminates the effect of additional cash flows and the return on such cash flows.
- (b) It seeks to measure the rate of return earned per rupee invested in the fund over a period of time, had there been no withdrawals from or further investments to that rupee.

3) Rupee Weighted Rate of Return (RWROR):

- (a) This method seeks to measure the internal rate of return based on absolute movements in cash with reference to the Mutual Fund. The Fund Value at the beginning of the year is equated to investment and the dividend distribution and the year end fund value are equated to cash flows received.
- (b) **Factors:** Factors affecting the RWROR are —
- Beginning and ending market values.
 - Timing of the net contributions to the fund.

Example: Premier Fund furnishes the following particulars for the year ended 31.03.2012

Particulars
Fund Value as at 01.04.2011
NAV as at 30.06.2011
Distribution of Dividend on 30.06.2011
NAV as at 30.09.2011
NAV as at 31.12.2011
Inflow of further capital into Fund on 31.12.2011
NAV as at 31.03.2012

a) Computation of Time Weighted Rate of Return:

This method seeks to measure the rate of return per rupee over the period of one year, had there not been any further inflow of funds or distribution of dividend or capital.

Period	Opening Value	Closing Value	Return	Rate of Return
01.04.2011 to 30.06.2011	1,00,000	1,20,000	20,000	20.00% [20,000 ÷ 1,00,000]
01.07.2011 to 30.09.2011	1,10,000 [1,20,000-10,000]	1,30,000	20,000	18.18% [20,000 ÷ 1,10,000]
01.10.2011 to 31.12.2011	1,30,000	1,65,000	35,000	26.92% [35,000 ÷ 1,30,000]
01.01.2011 to 31.03.2012	1,90,000 [1,65,000 + 25,000]	1,80,000	(10,000)	5.26% [10,000 ÷ 1,90,000]

Time Weighted Rate of Return = Compounded Return for the Year

= Value of ₹1 at the end of the Year **Less** ₹1

$$= [(1 + 20\%) \times (1 + 18.18\%) \times (1 + 26.92\%) \times (1 - 5.26\%)] - 1$$

$$= [1.20 \times 1.1818 \times 1.2692 \times 0.9474] - 1$$

$$= 1.7053 - 1$$

$$= 0.7053 \text{ or } 70.53\%$$

Inference: Rupee 1 invested at the beginning of the year would have become ₹1.7053 at the end of the year, had there not been any dividend distribution or further inflow of capital funds. Therefore, the excess of ₹0.7053 constitutes the return over the one year period, i.e. Time Weighted Return.

b) Computation of Rupee Weighted Rate of Return:

Time Period (Quarters)	Nature	Cash Flow	Disc. Factor @ 10%	Disc. Cash Flow	Disc Factor @ 20%	Discounted Cash Flow
0	Investment (Opening NAV)	(1,00,000)	1.000	(1,00,000)	1.000	(1,00,000)
1	Dividend Distribution	10,000	0.909	9,090	0.833	8,330
2	—	—	0.826	—	0.694	—
3	Further Investment	(25,000)	0.751	(18,775)	0.579	(14,475)
4	Closing NAV	1,80,000	0.683	1,22,940	0.482	86,760
				13,255		(19,385)

Note: Discount Rate taken is quarterly rate.

Computation of Rupee Weighted Rate of Return (RWRR) = Internal Rate of Return:

$$\text{Internal Rate of Return [IRR]} = R_2 + \frac{[V_2 - V_M]}{[V_2 - V_1]} \times [R_1 - R_2]$$

$$= 20\% + [(-19,385 - 0)/(-19,385 - 13,255)] \times [10\% - 20\%]$$

$$= 20\% + [-19,385/-32,640] \times [-10\%]$$

$$= 20\% + 0.594 \times -10\%$$

$$= 20\% - 5.94\%$$

$$= 14.06\%$$

Therefore, RWRR per Quarter is 14.06% or 56.24% p.a.

Hedge funds:

Hedge funds are private investment vehicles not open to the general investment public. Hedge funds face less regulations than publicly traded mutual funds, allowing them to hold substantial short positions to preserve capital during market downturns. Typically, hedge fund managers generate profit from both long as well as short positions. The private nature of hedge funds often suits both the needs of investors and managers.

Features of Hedge Funds:

- Reduce risk, enhance returns and minimize the correlation with equity and bond markets.
- Flexibility in investment options.



- c) Variety in terms of investment returns, volatility and risk.
- d) Consistency of returns and capital preservation.
- e) Managed by experienced investment professionals who are generally disciplined and diligent.
- f) Pension funds, endowments, insurance companies, private banks and high net worth individuals and families invest in hedge funds to minimize overall portfolio volatility and enhance returns.
- g) Hedge funds benefit by heavily weighting hedge fund managers' remuneration towards performance incentives.

Hedging strategies adopted in case of Hedge Funds:

- a) **Selling short:** Selling shares without owning them, to buy them back at a future date at a lower price in the expectation that their price will drop.
- b) **Using arbitrage:** Seeking to exploit pricing inefficiencies between related securities.
- c) **Trading Options or Derivatives:** Contracts whose values are based on the performance of any underlying financial asset, index or other investment.
- d) **Investing in anticipation of a specific event:** Merger transaction, hostile takeover, spin-off, exiting of bankruptcy proceedings, etc.
- e) **Investing in deeply discounted securities:** Of companies about to enter or exit financial distress or bankruptcy, often below liquidation value.

Benefits of Hedge Funds:

- a) **Seek higher returns:** Hedge fund strategies generate positive returns in both rising and falling equity and bond markets.
- b) **Investment styles:** Huge variety of hedge fund investment styles - many uncorrelated with each other - provides investors with a wide choice of hedge fund strategies to meet their investment objectives.
- c) **Long term Solution:** Hedge funds provide an ideal long-term investment solution, eliminating the need to correctly time entry and exit from markets.
- d) **Diversification:**
 - i) Inclusion of hedge funds in a balanced portfolio reduces overall portfolio risk and volatility and increases returns.
 - ii) Adding hedge funds to an investment portfolio provides diversification not otherwise available in traditional investing.

Different Styles of Hedge Funds:

- (a) **Aggressive Growth:** Invests in equities, expected to experience acceleration in growth of earnings per share; generally high P/E ratios, low or no dividends. Often smaller and micro cap stocks which are expected to experience rapid growth. Includes sector specialist funds such as technology, banking, or biotechnology. Hedges by shorting equities where earnings disappointment is expected or by shorting stock indexes. Tends to be "long-biased." Expected volatility is high.
- (b) **Distressed Securities:** Buys equity, debt, or trade claims at deep discounts of companies in or facing bankruptcy or reorganization. Profits from the market's lack of understanding of the true value of the deeply discounted securities and because the majority of institutional investors cannot own below investment grade securities. Results generally not dependent on the direction of the markets. Expected volatility ranges from Low — Moderate.

- (c) **Emerging Markets:** Invests in equity or debt of emerging (less mature) markets that tend to have higher inflation and volatile growth. Short selling is not permitted in many emerging markets, and, therefore, effective hedging is often not available. Expected volatility is very high.
- (d) **Funds of Hedge Funds:** Mix and match hedge funds and other pooled investment vehicles. This blending of different strategies and asset classes aims to provide a more stable long-term investment return than any of the individual funds. Returns, risk, and volatility can be controlled by the mix of underlying strategies and funds. Capital preservation is generally an important consideration. Volatility depends on the mix and ratio of strategies employed. Expected volatility range is Low - Moderate - High.
- (e) **Income:** Invests with primary focus on yield or current income rather than solely on capital gains. May utilize leverage to buy bonds and sometimes fixed income derivatives in order to profit from principal appreciation and interest income. Expected volatility is low.
- (f) **Macro:** Aims to profit from changes in global economies, typically brought about by shifts in government policy that impact interest rates, in turn affecting currency, stock, and bond markets. Participates in all major markets - equities, bonds, currencies and commodities - though not always at the same time. Uses leverage and derivatives to accentuate the impact of market moves. Utilizes hedging, but the leveraged directional investments tend to make the largest impact on performance. Expected volatility is very high.
- (g) **Arbitrage:** Attempts to hedge out most market risk by taking offsetting positions, often in different securities of the same issuer. May also use futures to hedge out interest rate risk. Focuses on obtaining returns with low or no correlation to both the equity and bond markets. These relative value strategies include fixed income arbitrage, mortgage backed securities, capital structure arbitrage, and closed-end fund arbitrage. Expected volatility is low.
- (h) **Securities Hedging:** Invests equally in long and short equity portfolios generally in the same sectors of the market. Market risk is greatly reduced, but effective stock analysis and stock picking is essential to obtaining meaningful results. Leverage may be used to enhance returns. Usually low or no correlation to the market. Sometimes uses market index futures to hedge out systematic (market) risk. Relative benchmark index usually T-bills. Expected volatility is low.
- (i) **Market Timing:** Allocates assets among different asset classes depending on the manager's view of the economic or market outlook. Portfolio emphasis may swing widely between asset classes. Unpredictability of market movements and the difficulty of timing entry and exit from markets add to the volatility of this strategy. Expected volatility is high.
- (j) **Opportunistic:** Investment theme changes from strategy to strategy as opportunities arise to profit from events such as IPOs, sudden price changes often caused by an interim earnings disappointment, hostile bids, and other event-driven opportunities. May utilize several of these investing styles at a given time and is not restricted to any particular investment approach or asset class. Expected volatility is variable.
- (k) **Multi Strategy:** Investment approach is diversified by employing various strategies simultaneously to realize short- and long-term gains. Other strategies may include systems trading such as trend following and various diversified technical strategies. This style of investing allows the manager to overweight or underweight different strategies to best capitalize on current investment opportunities. Expected volatility is variable.
- (l) **Short Selling:** Sells securities short in anticipation of being able to re-purchase them at a future date at a lower price due to the manager's assessment of the overvaluation of the securities, or the market, or in anticipation of earnings disappointments often due to accounting irregularities, new competition, change of management, etc. Often used as a hedge to offset long-only portfolios and by those who feel the market is approaching a bearish cycle. Risk is high. Expected volatility is very high.



- (m) **Special Situations:** Invests in event-driven situations such as mergers, hostile takeovers, reorganizations, or leveraged buyouts. May involve simultaneous purchase of stock in companies being acquired, and the sale of stock in its acquirer, hoping to profit from the spread between the current market price and the ultimate purchase price of the company. May also utilize derivatives to leverage returns and to hedge out interest rate and/or market risk. Results generally not dependent on direction of market. Expected volatility is moderate.
- (n) **Value:** Invests in securities perceived to be selling at deep discounts to their intrinsic or potential worth. Such securities may be out of favour or under followed by analysts. Long-term holding, patience, and strong discipline are often required until the ultimate value is recognized by the market. Expected volatility is Low - Moderate.

Comparison of Hedge Funds and Mutual Funds:

- 1) **Similarities between Hedge Funds and Mutual Funds:** They are pooled investment vehicles (i.e. several investors entrust their money to a manager) and invest in publicly traded securities.
- 2) **Differences between Mutual Funds and Hedge Funds:**
 - (a) Mutual Funds seek Relative Returns whereas Hedge Funds actively seek Absolute Returns.
 - (b) In a bull market, hedge funds may not perform as well as mutual funds, but in a bear market - taken as a group or asset class - they do better than mutual funds because they hold short positions and hedges.

Categories of Hedge Funds:

- 1) **Arbitrage Strategies (Relative Value):** Arbitrage is the exploitation of observable price inefficiency and, as such, pure arbitrage is considered risk less. The arbitrage strategies include use of - (1) Derivative Instruments, (2) Trading Software, and (3) Various Trading Exchanges.
- 2) **Event-Driven Strategies:** Event-driven strategies take advantage of transaction announcements and other one-time events. There are various types of event-driven strategies.
Example: "Distressed Securities" involves investing in companies that are re-organizing or have been unfairly beaten down.
- 3) **Directional or Tactical Strategies:** The largest group of hedge funds uses directional or tactical strategies. Directional or tactical strategies are:
 - (a) Long/short strategies to combine purchases (long positions) with short sales.
 - (b) Dedicated short strategies to specialize in the short sale of over-valued securities.

Demerits associated with Hedge Funds:

- 1) **Multiple Risks:** Hedge fund investors are exposed to multiple risks, and each strategy has its own unique risks.
- 2) **Skewed Return paths:** Hedge fund returns tend to be negatively skewed, which means they bear the dreaded "fat tails", which are characterized by positive returns but a few cases of extreme losses.
- 3) **Time-consuming:** Investing in a single hedge fund requires time-consuming due diligence and concentrates risk.
- 4) **Cost:** Hedge funds create a double-fee structure. There is a payment of management fee to the fund manager in addition to fees normally paid to the underlying hedge funds.
- 5) **Over-diversification:** A fund of hedge funds needs to coordinate its holdings or it will not add value. (If it is not careful, it may inadvertently collect a group of hedge funds that duplicates its various holdings or ends up constituting a representative sample of the entire market).

ILLUSTRATIONS**Computation of Net Asset Value (NAV)****Illustration1.**

The following particulars relates to Gilt Fund Scheme :-

Particulars		Value
1.	Investment in Shares (at Cost)	
	• IT and ITES Companies	₹28 Crores
	• Infrastructure Companies	₹15 Crores
	• Aviation, Transport and Logistics	₹7 Crores
	• Automotive	₹32 Crores
	• Banking / Financial Services	₹8 Crores
2.	Cash and Other Assets in Hand (even throughout the fund period)	₹2 Crores
3.	Investment in Fixed Income Bearing Bonds	
	• Listed Bonds [10,000 10.50% Bonds of ₹1 0,000 each]	₹10 Crores
	• Unlisted Bonds	₹8 Crores
4	Expenses payable as on closure date	₹3 Crore
5	Market Expectation on Listed Bonds	8.40%
6	No. of Units Outstanding	5.50 Crores

The particulars relating to sectoral index are as follows —

Sector	Index on the date of purchase	Index on the valuation date
IT and ITES	1750	2950
Infrastructure	1375	2475
Aviation, Transport & Logistics	1540	2570
Automotive	1760	2860
Banking / Financial	1600	2300

Required :-

- Net Asset Value of the Fund
- Net Asset Value per Unit
- If the period under consideration is 2 Years, and the Fund has distributed ₹2 per unit per year as Cash
- Dividend, ascertain the Net Return (Annualized). Ascertain the Expense Ratio, if the Fund has incurred the following expenses —

Management and Advisory Fees	₹275 Lakhs
Administration Expenses (including Fund Manager Remuneration)	₹350 Lakhs
Publicity and Documentation	₹80 Lakhs
	₹705 Lakhs

**Solution:**

1. Net Asset Value of the Fund

Particulars	₹ in Crore
1. Market Value of Shares in —	
(a) IT and ITES [Cost ₹28 X Closing Sector Index 2950 ÷ Opening Sector Index 1750]	47.20
(b) Infrastructure [Cost ₹15 X Closing Sector Index 2475 ÷ Opening Sector Index 1375]	27.00
(c) Aviation [Cost ₹7 X Closing Sector Index 2570 ÷ Opening Sector Index 1540]	11.68
(d) Automotive [Cost ₹32 X Closing Sector Index 2860 ÷ Opening Sector Index 1760]	52.00
(e) Banking [Cost ₹8 X Closing Sector Index 2300 ÷ Opening Sector Index 1600]	11.50
2. Market Value of Investment in Listed Bonds [Face Value ₹10 Crores X Interest on Face Value 10.50% ÷ Market Expectation 8.40%]	12.50
3. Cost of Investment in Unlisted Bonds	8.00
4. Cash and Other Assets	2.00
Total Assets of the Fund	171.88
Less: Outstanding Expenses	(3.00)
Net Asset Value of the Fund	168.88

Note: It is assumed that Cash and other Assets existed from the beginning of the period at the same values.

2. Net Asset Value per Unit

NAV per Unit = Net Asset Value of the Fund ÷ No. of Units Outstanding = ₹168.88 Crores ÷ 5.50 Crore Units = ₹30.71

3. Annualized Return on Fund

(a) Computation of Opening NAV

Particulars	₹ in Crore
1. Investment in Shares (at Cost)	
• IT and ITES Companies	28.00
• Infrastructure Companies	15.00
• Aviation, Transport and Logistics	7.00
• Automotive	32.00
• Banking /Financial Services	8.00
2. Investment in Fixed Income Bearing Bonds	
• Listed Bonds [10,000 10.50% Bonds of ₹10,000 each]	10.00
• Unlisted Bonds	8.00
Net Asset Value	108.00

Note: Cash and Other Assets are not included because they arise out of investments made in the beginning.

(b) Computation of Opening NAV per Unit

NAV per Unit = Net Asset Value of the Fund ÷ No. of Units Outstanding = ₹108.00 Crores ÷ 5.50 Crore Units = ₹19.64

(c) Computation of Returns per Unit

• Capital Appreciation= Closing NAV per Unit - Opening NAV per Unit
= ₹30.71 Less ₹19.64 = ₹11.07

- Cash Dividend = ₹2 X 2 Years = ₹4
- Returns = [Cash Dividend + Capital Appreciation] ÷ Opening NAV
= [₹4.00 + ₹11.07] ÷ ₹19.43 = ₹15.07 ÷ ₹19.64 = 77%
- Return p.a = Total Return/Period = 77% ÷ 2 Years = 38.50%

4. Expense Ratio

- (a) Total Expense = Management Advisory Fee ₹2.75 Cr. + Administration Exp. ₹3.50 Cr. + Publicity and Documentation ₹0.80 Cr. = ₹7.05 Crores
- (b) Average Value of Portfolio
= (Opening Net Asset Value + Closing Net Asset Value) ÷ 2
= (₹108 Crores + ₹168.88 Crores) ÷ 2 = ₹276.88 Crores ÷ 2
= ₹138.44 Crores
- (c) Expense Ratio = Total Expenses ÷ Average Value of Portfolio
= (₹7.05 Crores ÷ ₹138.44 Crores) × 100
= 5.00%
- (d) Expense Per Unit = Total Expenses ÷ No. of Units = ₹7.05 Crores ÷ 5.50 Crores = ₹1.282

Illustration 2.

Find out NAV per unit from the following information of Scheme Money Plant

Name of the scheme	Money Plant
Size of the scheme	₹100 Lakhs
Face value of the shares	₹100
Number of the outstanding shares	₹1 Lakhs
Market value of the fund's investments	₹180 Lakhs
Receivables	₹2 Lakhs
Liabilities	₹1 Lakh

Solution:

Particulars	Amount
Total Assets	Market Value of Fund's Investments + Receivables = ₹180 Lakhs + ₹2 Lakhs = ₹182 Lakhs
Liabilities	₹1 Lakhs
No. of shares	1 Lakhs
Net Asset Value	(Total Assets + Receivables – Liabilities) / No. of shares = ₹(182 – 1) Lakhs / 1 Lakhs = ₹181.00

Illustration 3.

A Mutual Fund made an issue of ₹10,00,000 units of ₹10 each on 01.01.2012. No entry load was charged. It made the following investments:



Particulars	₹
50,000 Equity Shares of ₹100 each @ ₹160	80,00,000
7% Government Securities	8,00,000
9% Debentures (Unlisted)	5,00,000
10% Debentures (Listed)	5,00,000
	98,00,000

During the year, dividends of ₹12,00,000 were received on equity shares. Interest on all types of debt securities was received as and when due. At the end of the year equity shares and 10% debentures are quoted at 175% and 90% respectively. Other investments are quoted at par.

Find out the Net Asset Value (NAV) per unit given that the operating expenses during the year amounted to ₹5,00,000. Also find out the NAV, if the Mutual Fund had distributed a dividend of Re.0.90 per unit during the year to the unit holders.

Solution:

Given the Total Initial Investments is ₹98,00,000, out of issue proceeds of ₹1,00,00,000. Therefore the balance of ₹2,00,000 is considered as Issue Expenses.

Computation of Closing Net Asset Value

Particulars	Opening Value of Investments	Capital Appreciation	Closing Value of Investments	Income
Equity Shares	80,00,000	7,50,000	87,50,000	12,00,000
7% Govt. Securities	8,00,000	Nil	8,00,000	56,000
9% Debentures (unlisted)	5,00,000	Nil	5,00,000	45,000
10% Debentures (Listed)	5,00,000	-50,000	4,50,000	50,000
Total	98,00,000	7,00,000	1,05,00,000	13,51,000
Less: Operating Expenses during the period				(5,00,000)
Net Income				8,51,000
Net Fund Balance = 1,05,00,000 + 8,51,000				1,13,51,000
Less: Dividend = ₹ 9,00,000 (10,00,000 X 0.90)				(9,00,000)
Net Fund Balance (after Dividend)				1,04,51,000
Net Asset Value (Before Considering Dividends) = 1,13,51,000 ÷ 10,00,000				11.351
Net Asset Value (After Dividends) = 1,04,51,000 ÷ 10,00,000				10.45

Note: It has been assumed that the Closing Market Price of the investments have been quoted at a percentage of the Face Value.

Computation of Annualised Return

Illustration 4.

A Good luck Mutual Fund that had a Net Asset Value of ₹17 at the beginning of a month, made income and capital gain distribution of Re.0.04 and Re.0.03 respectively per unit during the month, and then ended the month with a Net Asset Value of ₹17.08. Calculate monthly and annual rate of return.

Solution:

Particulars	Amount (₹)
Opening NAV	17.00
Closing NAV	17.08
Capital Appreciation = Closing NAV- Opening NAV = 17.08 - 17.00	0.08
Dividend Distribution	0.04
Capital Gain Distribution	0.03
Total Return for the period = Capital Appreciation + Income + Capital Gains = 0.08 + 0.04 + 0.03	0.15
Monthly Return = Total Return ÷ Opening NAV = 0.15 ÷ 17	0.8824% p.m.
Annual Return = Monthly Return X 12 = 0.8824 X 12	10.59% p.a.

Computation of Annualised Return**Illustration 5.**

Ram invested in a Mutual Fund when the Net Asset Value was ₹12.65. 60 Days later the Asset Value per unit of the fund was ₹12.25. In the meantime, Ram had received a cash dividend of Re.0.50 and a Capital Gain distribution of Re.0.30. Compute the monthly return.

Solution:

- (a) Dividend = ₹ 0.50
- (b) Capital Gain Distribution = ₹ 0.30
- (c) Capital Appreciation = (₹ 0.40) (Closing NAV ₹12.25 Less Opening NAV ₹12.65)
- (d) Returns = [Dividend + Capital Gain Distribution + Capital Appreciation] ÷ Opening NAV

$$= [\text{₹ } 0.50 + \text{₹ } 0.30 - \text{₹ } 0.40] \div \text{₹ } 12.65$$

$$= \text{₹ } 0.40 \div \text{₹ } 12.65 = 3.16\%$$
- (e) Annualized Return = Return x 365 ÷ Period

$$= 3.16\% \times 365 \text{ Days} \div 60 \text{ Days} = 19.22\% \text{ p.a.}$$
- (f) Monthly Return = 19.22% ÷ 12 = 1.60% per month

Net Asset Value of Mutual Fund**Illustration 6.**

Mr. Arun on 1.7.2009, during the initial offer of some Mutual Fund invested in 10,000 units having face value of ₹10 for each unit. On 31.3.2010 the dividend operated by the M.F. was 10% and Mr. Arun found that his annualized yield was 153.33%. On 31.12.2011, 20% dividend was given. On 31.3.2012 Mr. Arun redeemed all his balance of 11,296.11 units when his annualized yield was 73.52%. What are the NAVs as on 31.3.2010, 31.12.2011 and 31.3.2012.



Solution:

1. NAV as at 31.03.2010

Particulars	₹
Annualised Yield	153.33%
Yield for 9 months [From 1.7.2009 till 31.03.2010] $[153.33 \times 9 \div 12]$	115%
Return for 9 Months [Investment ₹1,00,000 X 115%]	₹ 1,15,000
Less: Dividends at 10% of Opening Value $[10,000 \text{ Units} \times ₹10 \times 10\%]$	(₹10,000)
Net Capital Appreciation	₹1,05,000
Closing NAV (Investment ₹1,00,000 + Capital Appreciation ₹1,05,000)	₹2,05,000
No. of Units Outstanding	10,000
NAV per Unit	₹20.50
Dividends are Reinvested at ₹20.50. therefore, Additional Units purchased as at 31.03.2010 $[\text{Dividends } ₹10,000 \div \text{NAV p.u. } ₹20.50]$	487.80
Total No. of Units as at 31.03.2010 (after reinvestment of dividend)	10,487.80

2. NAV as at 31.12.2011

Particulars	₹
Units Outstanding as at 31.12.2011	10,487.80
Face Value at ₹10 $(10,487.80 \text{ Units} \times ₹10 \text{ p.u.})$	₹1,04,878
Dividend distributed at 20% $(₹1,04,878 \times 20\%)$	₹20,975.6
No. of Units as at 31.03.2012 (Given)	11,296.11
Less: No. of Units as at 31.12.2011	10,487.80
No. of Units issued against reinvestment of dividend	808.31
Dividends will be reissued at the NAV as at 31.12.2011. Therefore, NAV = Dividends $\div$ No. of Units reissued = $₹20,975.60 \div 808.31 \text{ Units} =$	₹25.95

3. NAV as at 31.03.2012

Particulars	₹
Annualized Yield as on 31.03.2012	73.52%
Yield for 33 months [From 1.7.2009 till 31.03.2012] $[73.52 \times 33 \div 12]$	202.18
Return for 33 Months [Investment ₹1,00,000 X 202.18%]	₹2,02,180
Add: Opening Investment	₹1,00,000
Closing Fund Value (Dividends need not be excluded, since they are reinvested)	₹3,02,180
No. of Units Outstanding as at 31.03.2012	11,296.11
NAV per Unit $(₹3,02,180 \div 11,296.11 \text{ Units})$	₹26.75

RETURN ON MUTUAL FUND

Illustration 7.

In case of an open ended Mutual Fund scheme the market price (ex-dividend) was ₹65. A dividend of ₹14 has just been paid and ex-dividend price now is ₹81 what return has been earned over the past year.

Solution:

(a) Capital Appreciation = Closing NAV p.u. - Opening NAV p.u.

$$= ₹81 - ₹65$$

$$= ₹16$$

(b) Returns = [Cash Dividend + Capital Appreciation + Capital Gains] ÷ Opening NAV

$$= (14 + 16) / 65 = 46.15 \%$$

Return on Mutual Fund**Illustration 8.**

(a) A mutual fund had a Net Asset Value (NAV) of ₹62 at the beginning of the year. During the year a sum of ₹5 was distributed as dividend besides ₹3 as capital gains distribution. At the end of the year NAV was ₹70. Calculate total return for the year.

(b) Suppose the aforesaid mutual fund in the next year gives a dividend of ₹5 and no capital gains distribution and NAV at the end of second year is ₹65. What is the return for the second year?

Solution:

Basic Data for Computation of Total Return

Particulars	Amount (₹)	
	Case (a)	Case (b)
Opening NAV	62	70
Dividend	5	5
Capital Gains	3	0
Closing NAV	70	65

Computation of Return

	Case (a)	Case(b)
Capital Appreciation = Closing NAV p.u. Less Opening NAV p.u.	70-62 = ₹8	65 - 70 = (₹5)
Returns = [Cash Dividend + Capital Appreciation + Capital Gains] ÷ Opening NAV	$= [5.00 + 8.00 + 3.00] \div ₹60$ $= 16.00 \div 60.00$ $= 26.67\%$	$= [(65-70) + 5 + 0] \div 65$ $= 0$

Effective Yield**Illustration 9.**

A has invested in three mutual fund schemes as per details below:

	MF 1	MF 2	MF 3
Date of investment	01.12.2009	01.01.2010	01.03.2010
Amount of investment	₹50,000	₹1, 00,000	₹50,000
Net Asset Value (NAV) at entry date	₹10.50	₹10	₹10
Dividend received upto 31.03.2013	₹970	₹1,520	Nil
NAV as at 31.03.2013	₹10.40	₹10.10	₹9.80

What is the effective yield on per annum basis in respect of each of the three schemes to Mr. Varun upto 31.03.2010?

**Solution:**

1. Computation of Net Value Added during the year ended 31.03.2013

Schemes	Opening NAV" (₹)	NAV as at entry date	Units No,	NAV as at 31.03.2013 (₹)	Total NAV 31.03.2013 (₹)	Net NAV (₹)
[1]	[2]	[3]	[4] = [2] ÷ [3]	[5]	[6] = [4]X[5]	[7] = [2]-[6]
MF 1	50,000	₹10.50	4761.905	10.40	49,523.812	(-)476.188
MF 2	1,00,000	₹10	10,000	10.10	1,01,000	(+)1,000
MF 3	50,000	₹10	5,000	9.80	49,000	(-) 1,000

2. Effective Yield in %

- Total Yield = Net NAV + Dividend
- Effective Yield in % = (Total Yield ÷ Opening NAV) X (365 ÷ No. of days of holding)

Schemes	Dividend Received (₹)	Total Yield	No. of days	Effective yield % p.a
MF 1	970	493.812	122	2.95%
MF 2	1,520	2,520	91	10.11%
MF 3	—	(-) 1,000	31	(23.55)%

MUTUAL FUND AND EQUITY RETURN — INDIFFERENCE**Illustration 10.**

Mr. Kiran can earn a return of 16 per cent by investing in equity shares on his own. Now he is considering a recently announced equity based mutual fund scheme in which initial expenses are 5.7 per cent and annual recurring expenses are 1.7 per cent. How much should the mutual fund earn to provide Mr. Kiran a return of 16 per cent?

Solution:

Let the Return on Mutual Funds be ₹ X

Investor's Expectation denotes the Return from the amount invested.

$$\text{Returns from Mutual Funds} = \frac{\text{Investors' Expectation}}{100 - \text{Issue Expenses}} + \text{Annual Recurring Expenses}$$

$$X = \frac{16}{(100 - 5.7)\%} 1.7 = 16.96 + 1.7 = 18.67\%$$

Return that the Mutual Fund should earn so as to provide a return of 16% = 18.67%

Monthly Return - Mutual Fund

Illustration 11.

A mutual fund that had a net asset value of ₹30 at the beginning of month and made income and capital gain distribution of Re.0.0375 and Re.0.03 per share respectively during the month, and then ended the month with a net asset value of ₹30.06. Calculate monthly return.

Solution:

Particulars	Amount (₹)
Opening NAV	30
Closing NAV	30.06
Capital Appreciation = Closing NAV - Opening NAV = 30.06 - 30.00	0.06
Capital Gain Distribution	0.03
Income during the period	0.0375
Total Return for the period Capital Appreciation + Income + Capital Gains = 0.06 + 0.0375 + 0.03	0.1275
Monthly Return = Total Return ÷ Opening NAV = 0.1275 ÷ 30	0.00425 / 0.425% p.m.
Annual Return = Monthly Return X 12 = 0.425 X 12	5.1% p.a.

RETURN — ANNUALIZED RETURN**Illustration 12.**

From the following data relating to investment made by a Company for the past 5 years, ascertain the expected return for the 6th year —

Years	1	2	3	4	5
Closing Market Price (₹)	50.00	64.00	85.00	100.00	125.00
Dividend Yield (₹)	4.00	8.00	10.00	15.00	15.00

Opening Market Price in Year 1 was ₹45. Also ascertain the Compounded Annual Growth Rate. What would be the Capital Annual Growth Rate if there were no dividend payouts at all?

Solution:

1. Computation of Total Return and Return %

Year	Opening Price (₹)	Closing Price (₹)	Dividend (₹)	Capital Appreciation (₹)	Total Return (₹)	Return %
1	2	3	4	5 = 3-2	6 = 4 + 5	7 = 6÷2
1	45.00	50.00	4.00	5.00	9.00	20.00%
2	50.00	64.00	8.00	14.00	22.00	44.00%
3	64.00	85.00	10.00	21.00	31.00	48.44%
4	85.00	100.00	15.00	15.00	30.00	35.29%
5	100.00	125.00	15.00	25.00	40.00	40.00%
			52.00	80.00	132.00	

Expected Return = Average Return

$$= (20.00\% + 44.00\% + 48.44\% + 35.29\% + 40.00\%) \div 5 = 187.73 \div 5 = 37.55\%$$

2. Computation of Compounded Annual Growth Rate

CAGR

$$= \sqrt[n]{\frac{\text{Total Return} + \text{Initial Investment}}{\text{Initial Investment}}} \quad [\text{Inverse of Compound Interest Formula}]$$

$$\text{Or} = [(\text{Total Return} + \text{Initial Investment}) \div \text{Initial Investment}]^{1/n} - 1$$



Where, “n” represents the period of holding.

(a) CAGR with Dividend Payouts:	(b) CAGR without Dividend Payouts:
$= [(Total\ Return + Initial\ Investment) \div Initial\ Investment]^{1/n} - 1$	$= [(Capital\ Appreciation\ Return + Initial\ Investment) \div Initial\ Investment]^{1/n} - 1$
$= [(\text{₹}132 + \text{₹}45) / \text{₹}45]^{1/5} - 1$	$= [(\text{₹}80 + \text{₹}45) / \text{₹}45]^{1/5} - 1$
$= 3.933^{1/5} - 1 = 1.3151 - 1 = 0.3151$ or 31.51	$= 2.778^{1/5} - 1 = 1.2267 - 1 = 0.2267$ or 22.67

Annual Recurring Expenses of a Mutual Fund

Illustration 13.

You can earn a return of 13 percent by investing in equity shares on your own. You are considering a recently announced equity mutual fund scheme where the initial issue expense is 7 percent. You believe that the mutual fund scheme will earn 16.5 percent. At what recurring expenses (in percentage terms) will you be indifferent between investing on your own and investing through the mutual fund.

Solution:

Let the annual Recurring expenses be ₹X

Returns from Mutual funds $\frac{\text{Investors' Expectation}}{100 - \text{Issue Expenses}} + \text{Annual recurring expenses}$

$$16.5\% = \frac{13}{(100 - 7)\%} + X$$

$$16.5\% = 13.97 + X$$

$$X = 16.5 - 13.97 = 2.53\%$$

Therefore, the Amount of Recurring Expenses for which the return will be indifferent is 2.53%.

Distribution / Reinvestment of Mutual Fund Returns

Illustration 14.

A Mutual Fund having 200 units has shown in NAV of ₹8.75 and ₹9.45 at the beginning and at the end of the year respectively.

The Mutual Fund has given two options:

(a) Pay ₹0.75 per unit as dividend and ₹0.60 per unit as a capital gain, or

(b) These distributions are to be reinvested at an average NAV of ₹8.65 per unit.

What difference it would make in terms of return available and which option is preferable?

Solution:

Basic Data for Computation

Particulars	Value (₹)
Opening NAV	8.75
Closing NAV	9.45
Dividend	0.75

Capital Gain Appreciation [Closing NAV - Opening NAV]	0.70
Capital Gain Distribution	0.60
Price Paid at the year beginning [200 units X ₹8.75]	1,750

Option 1: Returns are distributed to Mutual Fund Holders

(a) Preparation of Fund Balance Sheet

Liabilities	₹	Assets	₹
NAV on Closing Date [9.45x200]	1,890	Fund Assets	2,160
Dividend Payable [0.75x200]	150		
Capital Gain Distribution [0.60x200]	120		
Total	2,160	Total	2,160

$$\begin{aligned}
 \text{(b) Returns} &= \left[\frac{\text{Closing Fund Assets} - \text{Opening NAV}}{\text{Opening NAV}} \right] \\
 &= [2,160 - 1,750] \div ₹1,750 \\
 &= 23.43\%
 \end{aligned}$$

Option 2: The Distributions are reinvested at an average NAV of ₹8.65 per unit

(a) Distributions Reinvested

Particulars	₹
Capital Gain [0.60x200]	120
Dividend [0.75X200]	150
Total Distributions	270
No. of Units [Total Distributions ÷ Average NAV p.u. = 270 ÷ 8.65]	31.21 units

(b) Preparation of Fund Balance Sheet after Reinvestment

Liabilities	₹	Assets	₹
NAV on Closing Date		Fund Assets	2,160
— 200 units @ 9.45 1890			
— 31.21 units @ 8.65 270	2,160		
Total	2,160	Total	2,160

(c) Returns

$$\begin{aligned}
 \text{Opening NAV} &= \left[\frac{\text{Closing Fund Assets} - \text{Opening NAV}}{\text{Opening NAV}} \right] \\
 &= [2,160 - 1,750] \div ₹1,750 \\
 &= 23.43\%
 \end{aligned}$$

Conclusion:

Holding period return is the same from Investor's view point irrespective of whether the return is reinvested or distributed in the form of Capital Gains or Dividends.



Computation of Sharpe Ratio – Risk Premium Approach

Illustration 15.

Chintamani Fund, a fund which invests exclusively in Public Sector Undertakings, yielded ₹3.75 per Unit for the year. The opening NAV was ₹21.20. Chintamani Fund has a risk factor of 3.50%.

Ascertain the Sharpe Ratio and evaluate the funds performance in juxtaposition with performance of the Sensex if —

(a) Risk Free Return is 5%, Return on Sensex is 15% with a standard deviation of 2.75%.

(b) Risk Free Return is 4%, Return on Sensex is 17% with a standard deviation of 3%.

(c) Risk Free Return is 7%, Return on Sensex is 18% with a standard deviation of 4%.

Solution:

1. Formula for Computing Sharpe Ratio

$$\text{Sharpe Ratio} = (R_p - R_f) \div \sigma_p$$

Where, R_p = Return on portfolio

R_f = Risk Free Return

σ_p = Standard Deviation of Portfolio

Particulars	Case A	Case B	Case C
Risk Free Return [R_f]	5%	4%	7%
Market Return [R_M]	15%	17%	18%
Standard Deviation of Market Return [σ_M]	2.75%	3.00%	4.00%
Sharpe Ratio for Navratna Fund [$(R_p - R_f) \div \sigma_p$] [A]	3.63 [(17.69% - 5%) ÷ 3.50%]	3.91 [(17.69% - 4%) ÷ 3.50%]	3.05 [(17.69% - 7%) ÷ 3.50%]
Sharpe Ratio for Market Return [$(R_M - R_f) \div \sigma_M$] [B]	3.64 [(15% - 5%) ÷ 2.75%]	4.33 [(17% - 4%) ÷ 3%]	2.75 [(18% - 7%) ÷ 4%]
Sharpe Ratio is Higher for	Market Return	Market Return	Chintamani Fund
Inference / Evaluation	Market has outperformed Chintamani Fund's performance.	Market has outperformed Chintamani Fund's performance.	Chintamani Fund has outperformed Market's performance.

Note: Return on Chintamani Fund = Yield ₹ 3.75 ÷ Opening NAV ₹ 21.20 = 17.69%

Computation of Sharpe Ratio - Risk Premium Approach

Illustration 16.

Soma Funds has a fund named "F3 Fund" (F3F), a fund which invests in 3 different funds Fund X, Fund Y and Fund Z and the particulars of the Funds are -

Fund	Value Invested ₹	Return	Standard Deviation
X	2.5 Crores	15.50%	3.20%
Y	6.0 Crores	19.20%	4.50%
Z	1.5 Crores	12.80%	1.50%

Correlation between the Funds are as follows — XY 0.30; XZ 0.50; YZ 0.20

If the Risk Free Return is 5% and the return on Nifty is 17% with a standard deviation of 3%, ascertain the Sharpe's Index for F3F and evaluate its performance.

Solution:

1. Computation of Standard Deviation of F3F

(a) Basic Values of Factors for Determination of Portfolio Risk

Variance of Security X	σX^2	$3.20^2 = \mathbf{10.24}$
Variance of Security Y	σY^2	$4.50^2 = \mathbf{20.25}$
Variance of Security Z	σZ^2	$1.50^2 = \mathbf{2.25}$
Covariance of Securities X and Y [$\rho_{XY} \times \sigma X \times \sigma Y$]	Cov_{xy}	$0.30 \times 3.20 \times 4.50 = \mathbf{4.32}$
Covariance of Securities X and Z [$\rho_{XZ} \times \sigma X \times \sigma Z$]	Cov_{xz}	$0.50 \times 3.20 \times 1.50 = \mathbf{2.40}$
Covariance of Securities Y and Z [$\rho_{YZ} \times \sigma Y \times \sigma Z$]	Cov_{yz}	$0.20 \times 4.50 \times 1.50 = \mathbf{1.35}$
Weight of Security X	W_x	$\text{₹}2.5 \text{ Crore} \div \text{₹}10.0 \text{ Crore} = \mathbf{0.25}$
Weight of Security Y	W_y	$\text{₹}6.0 \text{ Crore} \div \text{₹}10.0 \text{ Crore} = \mathbf{0.60}$
Weight of Security Z	W_z	$\text{₹}1.5 \text{ Crore} \div \text{₹}10.0 \text{ Crore} = \mathbf{0.15}$

(b) Matrix

Securities		X	Y	Z
	Weights	0.25 W_x	0.60 W_y	0.15 W_z
X	0.25 W_x	10.24 (σx^2)	4.32 (Cov_{xy})	2.40 (Cov_{xz})
Y	0.60 W_y	4.32 (COV_{xy})	20.25 (σy^2)	1.35 (Cov_{yz})
Z	0.15 W_z	2.40 (Cov_{xz})	1.35 (Cov_{yz})	2.25 (σz^2)

(b) Computation of Portfolio Variance (σ_{XYZ}^2)

	Description	Computation ($W \times W \times Cov$) or ($W \times W \times \sigma^2$)	Product
1	$W_x \times W_y \times \sigma X^2$	$0.25 \times 0.25 \times 10.24$	0.640
2	$W_x \times W_y \times Cov_{xy}$	$0.25 \times 0.60 \times 4.32$	0.648
3	$W_x \times W_z \times Cov_{xz}$	$0.25 \times 0.15 \times 2.40$	0.090
4	$W_y \times W_x \times Cov_{xy}$	$0.60 \times 0.25 \times 4.32$	0.648
5	$W_y \times W_y \times \sigma Y^2$	$0.60 \times 0.60 \times 20.25$	7.290
6	$W_y \times W_z \times Cov_{yz}$	$0.60 \times 0.15 \times 1.35$	0.1215
7	$W_z \times W_x \times Cov_{xz}$	$0.15 \times 0.25 \times 2.40$	0.090
8	$W_z \times W_y \times Cov_{yz}$	$0.15 \times 0.60 \times 1.35$	0.1215
9	$W_z \times W_z \times \sigma Z^2$	$0.15 \times 0.15 \times 2.25$	0.051
	Variance of the Portfolio (σ_{xyz}^2)		9.70
	Standard Deviation (Risk) of the Portfolio (σ_{xyz}) ie. F3F		3.11%

2. Return on F3F

Return on F3F = Weighted Average Return of Fund X Fund Y and Fund Z

$$= [0.25 \times 15.50\%] + [0.60 \times 19.20\%] + [0.15 \times 12.80\%]$$

$$= 3.875\% + 11.52\% + 1.92\%$$

$$= \mathbf{17.315\%}$$

3. Computation of Sharpe Ratio for F3F and Evaluation

$$\text{Sharpe Ratio} = (R_p - R_f) \div \sigma_p$$

Where, R_p = Return on Portfolio

R_f = Risk Free Return

σ_p = Standard Deviation of Portfolio

Particulars	F3F	Market
Risk Free Return [R_f]	5%	5%
Return [R_p]	17.315%	17%
Standard Deviation of Market Return [σ_p]	3.11%	3%
Sharpe Ratio [$(R_p - R_f) \div \sigma_p$]	3.96 [(17.315% - 5%) $\div$ 3.11%]	4.00 [(17% - 5%) $\div$ 3%]
Sharpe Ratio is Higher for	Market Return	
Inference / Evaluation	Market has marginally outperformed F3F's performance.	

Evaluation of Fund Performance — Treynor Model

Illustration 17.

Four friends S, T, U, and V have invested equivalent amount of money in four different funds in tune with their attitude to risk, S prefers to play aggressive and is keen on equity-funds, T is moderately aggressive with a desire to invest upto 50% of his funds in Equity, whereas U does not invest anything beyond 20% in Equity. V, however, relies more on movement of market, and prefers any fund which replicates the market portfolio.

Their investment particulars, returns therefrom and Beta of the fund are given below —

Fund Invested	Return for the year	Beta Factor
Money Multiplier Fund (100% Equity)	23.50%	1.80
Balanced Fund (50% Equity - 50% Debt)	16.50%	1.25
Safe Money Fund (20% Equity and 80% Debt Funds)	12.50%	0.60

If the Market Return was 16% and the Risk Free Return is measured at 7%, which of the four friends were rewarded better per unit of risk taken?

Solution:

Particulars	S	T	U	V
Risk Free Return [R_f]	7%	7%	7%	7%
Fund Invested	Money Multiplier Fund	Balanced Growth Fund	Safe Money Fund	Market Portfolio
Beta of the Portfolio [β_p]	1.80	1.25	0.60	1.00
Return on Portfolio [R_p]	23.50%	16.50%	12.50%	16.00%
Treynor Measure [$(R_p - R_f) \div \beta_p$]	9.17 [23.50 - 7] $\div$ 1.80	7.60 [16.50 - 7] $\div$ 1.25	9.17 [12.50 - 7] $\div$ 0.60	9.00 [16 - 7] $\div$ 1
Ranking	1	3	1	2

Evaluation: Both S and U have earned the same Reward per unit of risk taken, which is more than the Market Reward to Risk of 9.00.

Six Portfolios experienced the following results during a 7-year period:

Illustration 18.

Portfolio	Average annual return	Standard Deviation	Correlation with market
P	18.6	27.0	0.81
Q	14.8	18.0	0.65
R	15.1	8.0	0.98
S	22.0	21.2	0.75
T	-9.0	4.0	0.45
U	26.5	19.3	0.63
Market Risk	12.0	12.0	
Free Rate	9.0		

(a)

Rank these Portfolios using —

- Sharpe's method, and
- Treynor's Method.

(b) Compare the ranking in part (a) and explain the reasons behind the differences.

Solution:

Portfolio	Sharpe's Method $[(R_p - R_f) \div \sigma_p]$	Ranking	$\beta = \rho_{sm} \times \frac{\sigma_s}{\sigma_m}$	Treynor Method $[(R_p - R_f) \div \beta_p]$	Ranking
P	0.3555 $[(18.6 - 9) \div 27]$	4	1.823 $[27 \times 0.81 \div 12]$	5.266 $[(18.6 - 9) \div 1.823]$	5
Q	0.3222 $[(14.8 - 9) \div 18]$	5	0.975 $[18 \times 0.65 \div 12]$	5.95 $[(14.8 - 9) \div 0.975]$	4
R	0.7625 $[(15.1 - 9) \div 8]$	2	0.653 $[8 \times 0.98 \div 12]$	9.342 $[(15.1 - 9) \div 0.653]$	3
S	0.6132 $[(22 - 9) \div 21.2]$	3	1.325 $[21.2 \times 0.75 \div 12]$	9.811 $[(22 - 9) \div 1.325]$	2
T	-4.5 $[-9 - 9) \div 4]$	6	0.15 $[4 \times 0.45 \div 12]$	-120 $[-9 - 9) \div 0.15]$	6
U	0.9067 $[(26.5 - 9) \div 19.3]$	1	1.013 $[19.3 \times 0.63 \div 12]$	17.27 $[(26.5 - 9) \div 1.013]$	1

Reasons for Difference between Sharpe and Treynor's method:

- Sharpe Index considers only the Standard Deviation and leaves market Standard Deviation and the Correlation whereas Treynor considers market Standard Deviation and Correlation.
- Greater correlation result in greater value of Beta. This would reduce the points in Treynor.
- Portfolio R which is ranked '2' in Sharpe is pushed a position back in Treynor owing to the correlation effect. Also evident in Portfolio P and Q.

Illustration 19.

Following information is available regarding four mutual funds:

Mutual Fund	Return	Risk σ	β (Beta)	Risk free rate
P	13	16	0.90	10
Q	17	23	0.86	10
R	23	39	1.20	10
S	14	25	1.38	10

Evaluate performance of these mutual funds using Sharp Ratio and Treynor's Ratio. Comment on the evaluation after ranking the funds.

Solution:

Mutual Fund	Under Sharpe's Method $[(R_p - R_f) / \sigma_p]$	Ranking	Under Treynor Method $[(R_p - R_f) / \beta_p]$	Ranking
P	$[(13-10)/16] = 0.19$	3	$[(13-10)/0.90] = 3.33$	3
Q	$[(17-10)/23] = 0.31$	2	$[(17-10)/0.86] = 8.14$	2
R	$[(23-10)/39] = 0.33$	1	$[(23-10)/1.20] = 10.83$	1
S	$[(15-10)/25] = 0.2$	4	$[(15-10)/1.38] = 2.89$	4

Inference: Ranks obtained as per Sharp Ratio as well as Treynor's Ratio is same. This indicates that all the mutual funds seem to be reasonably well diversified.

Reward to Variability / Volatility Ratio

Illustration 20.

The following are the data on Five mutual funds—

Fund	Return	Standard deviation	Beta
Raksha	16	8	1.50
Varsha	12	6	0.98
Vredhi	14	5	1.40
Mitra	18	10	0.75
Laheri	15	7	1.25

What is the reward-to-variability / volatility ratio and the ranking if the risk - free rate is 6 %?

Solution:

Formula for computing Reward-to-Volatility/Volatility Ratio is —

- Treynor's Ratio = $[(R_p - R_f) / \beta_p]$
- Sharpe's Measure = $[(R_p - R_f) / \sigma_p]$

Ranking based on Sharpe's Ratio and Treynor Method

Portfolio	Under Sharpe's Method $[(R_p - R_f) / \sigma_p]$	Ranking	Under Treynor Method $[(R_p - R_f) / \beta_p]$	Ranking
Raksha	$[(16-6)/8] = 1.25$	3	$[(16-6)/1.5] = 6.67$	3
Varsha	$[(12-6)/6] = 1$	5	$[(12-6)/0.98] = 6.12$	4
Vredhi	$[(14-6)/5] = 1.60$	1	$[(14-6)/1.4] = 5.71$	5
Mitra	$[(18-6)/10] = 1.20$	4	$[(18-6)/0.75] = 16$	1
Laheri	$[(15-6)/7] = 1.29$	2	$[(15-6)/1.25] = 7.2$	2

Evaluation of Fund Performance — Jensen's Alpha

Illustration 21.

Somnath Investments have floated a equity based fund scheme called "X-Cube", the funds of which will be invested only in stocks and bonds of infrastructure and construction companies.

60% of the Fund Value is invested in Companies engaged Commercial Construction Services and the other 40% in companies engaged in developing Residential Colonies/Townships.

Average Beta of return from development of Residential Townships is measured at 1.9 and that from commercial construction is measured at 1.4.

The benchmark index yields 11.20% return and RBI Bonds carry an interest rate of 4.25%.

Ascertain Jensen's Alpha from the following monthly particulars relating to "X-Cube" —

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Closing NAV	18.60	17.80	18.20	18.00	17.80	16.80	17.20	17.80	17.90	18.10	18.80	18.50
Dividend Payout	—	0.75	—	—	—	1.20	—	—	—	—	—	—

Opening NAV for January was ₹17.75.

Solution:

1. Computation of Return on "X-Cube" Scheme

Months	Opening NAV ₹	Closing NAV ₹	Dividend Distributed ₹	Total Return ₹	Return %
(1)	(2)	(3)	(4)	(5) = (4) + (3) - (2)	(6) = (5) ÷ (2) × 100
January	17.75	18.60	-	0.85	4.79%
February	18.60	17.80	0.75	(0.05)	(0.27%)
March	17.80	18.20	-	0.40	2.25%
April	18.20	18.00	-	(0.20)	(1.10%)
May	18.00	17.80	-	(0.20)	(1.11%)
June	17.80	16.80	1.20	0.20	1.12%
July	16.80	17.20	-	0.40	2.38%
August	17.20	17.80	-	0.60	3.49%
September	17.80	17.90	-	0.10	0.56%
October	17.90	18.10	-	0.20	1.12%
November	18.10	18.80	-	0.70	3.87%
December	18.80	18.50	-	(0.30)	(1.60%)
Total	214.75	215.50	1.95	2.70	15.50%

Therefore, Actual Return from "X—Cube" Scheme is $[R_{X-CUBE}]$ 15.50%.

2. Computation of Beta of "X-Cube" Scheme

Beta of 'X-Cube' = Weighted Average Beta of Commercial Construction and Residential Construction

$$\beta_{X-CUBE} = 60\% \times 1.40 + 40\% \times 1.90 = 0.84 + 0.76 = 1.60$$

3. Computation of Return of "X-Cube" under CAPM

Expected Return under CAPM $[E(R_{X-CUBE})]$

$$E(R_{X-CUBE}) = R_F + [\beta_{X-CUBE} \times (R_M - R_F)]$$

$$= 4.25\% + [1.60 \times (11.20\% - 4.25\%)]$$

$$= 4.25\% + [1.60 \times 6.95\%]$$

$$= 4.25\% + 11.12\%$$

$$= 15.37\%$$

4. Computation of Return of "X-Cube" under CAPM

Jensen's Alpha $[\sigma] = \text{Actual Return Less Return under CAPM}$

$$= R_{X-CUBE} \text{ Less } E(R_{X-CUBE})$$

$$= 15.50\% - 15.37\% = 0.13\%$$

Evaluation: Since, Jensen's Alpha is positive, it has exceeded the expectations and outperformed the Market Portfolio.

Evaluation of Fund Performance – Jensen's Alpha

Illustration 22.

The following particulars are furnished about three Mutual Fund Schemes, P, Q and R-

Particulars	Scheme P	Scheme Q	Scheme R
Dividend Distributed	₹1.75	—	₹1.30
Capital Appreciation	₹2.97	₹3.53	₹1.99
Opening NAV	₹32.00	₹27.15	₹23.50
Beta	1.46	1.10	1.40

Ascertain the Alpha of the three schemes and evaluate their performance, if Government of India Bonds carry an interest rate of 6.84% and the NIFTY has increased by 12.13%.

Solution:

Particulars	Scheme P	Scheme Q	Scheme R
Dividend Distributed	₹1.75	-	₹1.30
Add: Capital Appreciation	₹2.97	₹3.53	₹1.99
Total Return [A]	₹4.72	₹3.53	₹3.29
Opening NAV [B]	₹32.00	₹27.15	₹23.50
Actual Return $[A] \div [B] = [C]$	14.75% [4.72 ÷ 32.00]	13.00% [3.53 ÷ 27.15]	14.00% [3.29 ÷ 23.50]
Beta [D]	1.46	1.10	1.40
Expected Return under CAPM $[E(R_p)]$ [E] $R_F + \beta_p \times (R_M - R_F) = 6.84 + [D] \times (12.13 - 6.84)$	14.56% [6.84 + 1.46 × (12.13 - 6.84)]	12.66% [6.84 + 1.10 × 12.13 - 6.84]	14.25% [6.84 + 1.40 × (12.13 - 6.84)]
Jensen's Alpha (σ_p) [C] - [E]	0.18% (14.75-14.57)	0.34% (13.00-12.66)	(0.25%) (14.00-14.25)
Ranking	2	1	3

Evaluation: Schemes P and Q have outperformed the Market Portfolio (NIFTY), whereas Scheme R has under—performed in comparison with the NIFTY.

Morning Star index — Evaluation of Fund and Market

Illustration 23.

The following are the monthly returns for "Advantage Fund" and the Market Portfolio —

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Advantage Fund (%)	2	3	(1)	2	4	1	1	2	0	2	(2)	1
Market Portfolio (%)	3	2	0	2	3	0	(1)	3	(2)	2	1	3

Ascertain the Excess Return under Morning Star Index and rate its performance in comparison with the Market Portfolio, if the Risk Free Return is 9% p.a.

Solution:

1. Computation of Factors

Month	Advantage Fund (%)	Risk of Loss	Market Portfolio (%)	Risk of Loss
(1)	(2)	(3) – (2) – 0.75 [if (2) < 0.75]	(4)	(5) = (4) – 0.75 [if (4) < 0.75]
Jan	2.00	—	3.00	—
Feb	3.00	—	2.00	—
Mar	(1.00)	1.75	0.00	0.75
Apr	2.00	—	2.00	—
May	4.00	—	3.00	—
Jun	1.00	—	0.00	0.75
Jul	1.00	—	(1.00)	1.75
Aug	2.00	—	3.00	—
Sep	0.00	0.75	(2.00)	2.75
Oct	2.00	—	2.00	—
Nov	(2.00)	2.75	1.00	—
Dec	1.00	—	3.00	—
Total	15.00	5.25	16.00	6.00

Monthly Risk Free Return = 9% p.a. ÷ 12 = 0.75% p.a.

2. Computation of Morning Star Index (MSI)

Particulars	Advantage Fund	Market Portfolio
Total Return for 12 Months	15.00%	16.00%
Average Monthly Return [A]	$15 \div 12 = 1.25\%$	1.33%
Total Risk of Loss	5.25%	6.00%
Average Monthly Risk of Loss [B]	$5.25 \div 12 = 0.438\%$	$6.00 \div 12 = 0.500\%$
Morning Star Index (i.e. Excess Return) [A] – [B]	0.812% [1.25% – 0.438%]	0.83% [1.33% – 0.500%]

Evaluation: MSI of Advantage Fund is lesser than that of Market Portfolio. Therefore, Advantage Fund has underperformed.

Morning Star Index – Evaluation of Fund and Market

Illustration 24.

Evaluate performance of Funds M, N and the Market Portfolio from the following information available for the past six months —

Month (Return %)	Apr	May	Jun	Jul	Aug	Sep
Fund M	3.25	1.50	(1.00)	3.75	1.25	0
Fund N	2.50	(1.25)	0	2.75	2.25	1.25
Market Portfolio	1.00	(0.75)	2.00	1.75	0.25	3.25

The 6 Month Treasury Bills carry an interest rate of 6% p.a.

Solution:

1. Computation of Factors

Month	Fund M		Fund N		Market portfolio	
	Return	Risk of Loss	Return	Risk of Loss	Return	Risk of Loss
(1)	(2)	(3)=(2)- 0.50 [if (2)<0.50]	(4)	(5)=(4)- 0.50 [if (4)<0.50]	(6)	(7)=(6)- 0.50 [if (6)<0.50]
Apr	3.25	0.00	2.50	0.00	1.00	0.00
May	1.50	0.00	(1.25)	1.75	(0.75)	1.25
Jun	(1.00)	1.50	0.00	0.50	2.00	0.00
Jul	3.75	0.00	2.75	0.00	1.75	0.00
Aug	1.25	0.00	2.25	0.00	0.25	0.25
Sep	0.00	0.50	1.25	0.00	3.25	0.00
Total	8.75	2.00	7.50	2.25	7.50	1.50
Average	1.46 (8.75/6)	0.33 (2.00/6)	1.25 (7.50/6)	0.38 (2.25/6)	1.25 (7.50/6)	0.25 (1.50/6)

Monthly Risk Free Return = 9% p.a. ÷ 12 = 0.75% p.a.

2. Computation of Morning Star Index (MSI)

Particulars	Fund M	Fund N	Market Portfolio
Average Monthly Return [A]	1.46%	1.25%	1.25%
Average Monthly Risk of Loss [B]	0.33%	0.38%	0.25%
Morning Star Index (i.e. Excess Return) [A] - [B]	1.13% [1.46% -0.33%]	0.87% [1.25% -0.38%]	1% [1.25% -0.25%]
Ranking	1	3	2

Evaluation: Fund M has performed better than the Market Portfolio, while Fund N has not performed is good as the Market Portfolio despite having the equivalent average return during the period.

Fama's Net Selectivity — Evaluation of Fund and Market

Illustration 25.

You are given the following information about 3 funds, Tanni (All Equity Fund), Manni (Equal Debt and Equity Mix) and Danni (High Debt Low Equity Fund) -

Particulars	Tanni	Manni	Danni
Average Return	25%	18%	12%
Standard Deviation	10%	5%	3%
Correlation with Market	0.30	0.70	0.50

If Risk Free Return is 5%, Return on Market Portfolio is 16% with a standard deviation of 4%.

Ascertain —

- Total Gain and the Net Gain under Fama's Net Selectivity.
- Systematic Risk and Unsystematic Risk.

Solution:

Evaluation of Fund Tanni, Manni and Danni

Particulars	Tanni	Manni	Danni
Average Return $[R_p]$	25%	18%	12%
Standard Deviation $[\sigma_p]$ [Total Risk]	10%	5%	3%
Correlation with Market $[P_{PM}]$	0.30	0.70	0.50
	075	0875	0375
Portfolio Beta $[\beta_p] = P_{PM} \times \sigma_p \div \sigma_M$	$[0.30 \times 10 \div 4]$	$[0.70 \times 5 \div 4]$	$[0.50 \times 3 \div 4]$
	20%	13%	7%
Actual Risk Premium $[R_p - R_f]$ [A]	$[25 - 5]$	$[18 - 5]$	$[12 - 5]$
Computation of Net Gain:			
Desired Risk Premium $[(R_M - R_f) \times \sigma_p \div \sigma_M]$ [B]	27.5%	13.75%	8.25%
	$[11\% \times 10 \div 4]$	$[11\% \times 5 \div 4]$	$[11\% \times 3 \div 4]$
Fama's Net Selectivity [Net Gain] [A] – [B]	(7.5%)	0.75%	(1.25%)
Computation of Total Gain = Jensen's Alpha			
Desired Risk Premium $[(R_M - R_f) \times \rho_{PM} \times \sigma_p \div \sigma_M]$	8.25%	9.63%	4.13%
[C] Or [Risk Premium in [B] $\times \rho_{PM}$]	$[27.5\% \times 0.30]$	$[13.75\% \times 0.70]$	$[8.25\% \times 0.50]$
Total Gain [A] - [C]	11.75%	3.37%	2.87%
	$[20 - 8.25]$	$[13 - 9.63]$	$[7 - 4.13]$
Systematic Risk and Unsystematic Risk:			
Systematic Risk $[\sigma_p \times \sigma_p]$	7.50%	4.375%	1.125%
	$[10\% \times 0.75]$	$[5 \times 0.875]$	$[3 \times 0.375]$
Unsystematic Risk [Total Risk Less Systematic Risk]	2.50%	0.625%	1.875%
	$[10 - 7.50]$	$[5 - 4.375]$	$[3 - 1.125]$

Notes:

- (1) Risk Free Return $[R_f] = 5\%$;
- (2) Market Return $[R_M] = 16\%$;
- (3) Market Standard Deviation $[\sigma_M] = 4\%$;
- (4) Market Risk Premium $[R_M - R_f] = 16\% - 5\% = 11\%$.

Weighted Rate of Return

Illustration 26.

Ascertain the Time Weighted Rate of Return and annual Compounded Rupee Weighted Rate of Return from the following information given relating to Som Fund.

- Fund Value at the beginning is ₹6 Crores.
- 3 Months hence, the value had increased by 15% of the opening value.
- 3 Months hence, the value had increased by 12% of the value three months before. At that time, there was an outflow of ₹1Crore by way of dividends.
- 3 Months hence, the value had decreased by 10% of the value three months before.
- During the last three months of the year, value of the fund had increased by ₹1 Crores.

Solution:

1. Computation of Closing Value (as at the year end)

Time	Opening Value	Additions/ Appreciation	Distributions/ Depreciation	Closing Value
Months 1-3	6.0000	0.9000 [6.00 x 15%]	—	6.9000
Months 4-6	6.9000	0.8280 [6.90 x 12%]	1.0000	6.7280
Months 7-9	6.7280	—	0.6728 [6.7280 x 10%]	6.0552
Months 10-12	6.0552	1.0000	—	552.552

2. Time Weighted Rate Return:

(a) Computation of Closing Value ignoring cash flows in between

Particulars			₹ Crores
Add:	Opening Investment / Value Appreciation for First Three Months	[₹6 Crores x 15%]	6.0000 0.9000
Add:	Value at the end of 3 rd Month Appreciation for Months 4 to 6	[₹6.9 Crores X 12%]	6.9000 0.8280
Less:	Value at the end of 6 th Month Depreciation for Months 7 to 9	[₹7.728 Crores X 10%]	7.7280 (0.7728)
Add:	Value at the end of 9 th Month Appreciation for Months 10 to 12		6.9552 1.0000
Value at the end of the Year			7.9552

(b) Computation of Return

Return in Value = Value at the end of the Year - Value at the beginning of the year

$$= ₹7.9552 \text{ Crores} - ₹6 \text{ Crores} = ₹1.9552 \text{ Crores}$$

Return in % (Annual Compounding)

$$= \text{Return in Value} \div \text{Value at the beginning of the year}$$

$$= ₹1.9552 \text{ Crores} \div ₹6 \text{ Crores} = \mathbf{32.59\% \text{ (Annual Compounding)}}$$

Return in % (Quarterly Compounding) =

Product of each quarter's Closing Value (before dividend) ÷ Opening Value for the Quarter) - 1

$$= \frac{6.9000}{6.0000} \times \frac{7.7280}{6.000} \times \frac{6.0552}{6.7280} \times \frac{7.0552}{6.0552} - 1 = 1.3506 - 1 = 03506 \text{ or } 35.253\%$$

3. Rupee Weighted Rate Return:

(Measured from the Investor's Perspective)

It is the rate at which the Net Present Value of Cash Flow will be equal to zero i.e. Internal Rate of Return presuming that the investor will receive equivalent to the closing value.

(a) Computation of Return in %

Return (Value) = Dividend + Capital Appreciation

$$= ₹1 \text{ Crore} + [\text{Closing Value of ₹7.0552 Crores Less Opening Value of ₹6 Crores}]$$

$$= ₹1 \text{ Crore} + ₹1.0552 \text{ Crores} = 2.0552 \text{ Crores}$$

Return in % = Return in Value ÷ Opening Value = ₹2.0552 Crores ÷ ₹6 Crores = **34.253%** Average Quarterly
Discount Rate = $34.253 \div 4 = 8.56\%$

(b) Computation of Net Present Value

Note: Since cash flows occur on a quarterly basis, Present Value factor is based on quarterly discount rate. The First Discount Rate chosen 9% (average quarterly discount rate rounded off to nearest %)

Time Period (Quarters)	Nature	Cash Flow	Discount Factor @ 9%	Discounted Cash Flow	Discount Factor @ 8%	Discounted Cash Flow
0	Investment (Opening NAV)	(6.000)	1.000	(6.000)	1.000	(6.000)
1	—	—	0.917	—	0.926	—
2	Dividend Distribution	1.000	0.842	0.842	0.857	0.857
3	—	—	0.772	—	0.794	—
4	Closing NAV	7.0552	0.708	4.993	0.735	5.186
				(0.165)		0.043

Since the NPV using Rate 1 is negative, Rate 2 should be lower than Rate 1 to get a positive NPV.

(c) Computation of Internal Rate of Return

Computation of Rupee Weighted Rate of Return (RWRR) = Internal Rate of Return:

Internal Rate of Return [IRR]

$$= R_2 - \frac{[V_2 - V_M]}{[V_2 - V_1]} \times [R_1 - R_2]$$

$$= 8\% + \frac{[0.043 - VM]}{[0.043 - (-0.165)]} \times [9\% - 8\%]$$

$$= 8\% + [0.043 / 0.208] \times 1\% = 8.207\%$$

$$= 8.207\% \text{ per quarter}$$

Therefore, RWRR per Quarter is 8.207% or 32.828% p.a.

(d) Rupee Weighted Rate of Return

Risk Weighted Rate of Return = Internal Rate of Return = **32.828%**

Illustration 27.

Gargi Ltd has promoted an open-ended equity oriented scheme in 2004 with two plans — Dividend Reinvestment Plan (Plan X) and Bonus Plan (Plan Y); the face value of the units was ₹10 each. P and Q invested ₹5 Lakhs each on 01.04.2006 respectively in Plan X and Plan Y, when the NAV was ₹42.18 for Plan X and ₹35.02 for Plan Y. P and Q both redeemed their units on 31.03.2013. Particulars of dividend and bonus declared on the units over the period were as follows —



Date	Dividend	Bonus Ratio	NAV for Plan X	NAV for Plan Y
15.09.2006	15	—	46.45	29.10
28.07.2007	—	1 : 6	42.18	30.05
31.03.2008	20	—	48.10	34.95
31.10.2008	—	1 : 8	49.60	36.00
15.03.2009	18	—	52.05	37.00
24.03.2010	—	1:11	53.05	38.10
27.03.2011	16	—	54.10	38.40
28.02.2012	12	1:12	55.20	39.10
31.03.2013	—	—	50.10	34.10

You are required to calculate the annual return for P and Q after taking into consideration the following information —

- (a) Securities Transaction Tax at 2% on redemption
- (b) Liability of Capital Gains to Income Tax —
 - (i) Long Term Capital Gains — Exempt
 - (ii) Short Term Capital Gains —10% Plus Education Cess at 3%.

Solution:

Note: Under Dividend Reinvestment Plan, dividend will be declared as percentage of the face value of units outstanding, and units will be allotted for the amount of dividend based on the NAV on the date of dividend declaration.

1. Plan X for Mr. P

(a) Units Purchased

Particulars	Value
Amount Invested	₹5,00,000
NAV per Unit on 01.04.2006	₹42.18
No. of Units Purchased $[\text{₹}5,00,000 \div \text{₹}42.18]$	11,853.96

(b) Units Allotted under Dividend Reinvestment

Date of Dividend	Units Outstanding	Dividend Rate	Dividend Amount	NAV on : that date	Additional Units Allotted	Total Units
1	2	3	$4 = 2 \times \text{₹}10 \times 3$	5	$6 = 4 \times 5$	7
15.09.2006	11,853.96	15%	₹ 17,780.94 $[11,853.96 \times \text{₹}10 \times 0.15]$	₹46.45	382.79 $[17780.94 \div 46.45]$	12,236.75
31.03.2008	12,236.75	20%	₹24,473.50 $[12,236.75 \times \text{₹}10 \times 0.20]$	₹48.10	508.80 $[24473.50 \div 48.10]$	12,745.55
15.03.2009	12,745.55	18%	₹22,941.99 $[12,745.55 \times \text{₹}10 \times 0.18]$	₹52.05	440.77 $[22941.99 \div 52.05]$	13,186.32
27.03.2011	13,186.32	16%	₹21,098.11 $[13,186.32 \times \text{₹}10 \times 0.16]$	₹54.10	389.98 $[21098.11 \div 54.10]$	13,576.30
28.02.2012	13,576.30	12%	₹16,291.56 $[13,576.30 \times \text{₹}10 \times 0.12]$	₹55.20	295.14 $[13576.3 \div 55.20]$	13,871.44

(c) Redemption Proceeds and Annual Return

Particulars			Value
Units Redeemed			13,871.44
NAV per Unit on 31.03.2013 (date of redemption)			₹50.10
Less:	Gross Redemption Proceeds [13,871.44 Units X ₹50.10]		₹6,94,959.14
	Securities Transaction Tax @ 2%		₹13,899.18
Less:	Net Proceeds		₹6,81,059.96
	Initial Investment		₹5,00,000.00
Total Return for 7 Years			₹1,81,059.96
Annual Return			5.17%
$= \frac{\text{Total Return}}{\text{Initial Investment}} \times \frac{1}{\text{Period of Investment}}$			
$= \frac{1,81,059.96}{5,00,000} \times \frac{1}{7 \text{ Years}} = 5.17\%$			

Note: Since all the units redeemed are held for more than 12 months, all the units are long term capital assets under the income tax, and therefore, gain on their redemption is exempt from income tax.

2. Plan Y for Mr. Q

(a) Units Purchased

Particulars		Value
Amount Invested		₹5,00,000
NAV per Unit on 01.04.2006		35.02
No. of Units Purchased [₹5,00,000 - ₹35.02]		14,277.56

(b) Units Allotted under Bonus

Date	Description	Units
01.04.2006	Purchase of Units for ₹5,00,000 at ₹35.02 per Unit	14,277.56
28.07.2007	Add: Bonus Issue at 1 : 6 = $1/6 \times 14,277.56$	2,379.59
01.10.2008	Total Units after: First Bonus Issue	16,657.15
	Add: Bonus Issue at 1 : 8 = $1/8 \times 16,657.15$	2,082.14
24.03.2010	Total Units after Second Bonus Issue	18,739.29
	Add: Bonus Issue at 1 : 11 = $1/11 \times 18,739.29$	1,703.57
28.02.2012	Total Units after Third Bonus Issue	20,442.86
	Add: Bonus Issue at 1 : 12 = $1/12 \times 20,442.86$	1,703.57
31.03.2012	Total Units after Fourth Bonus Issue = Units Outstanding on the date of redemption i.e. 31.03.2013	22,146.43

(c) Redemption Proceeds and Annual Return

Particulars .		Value
Units Redeemed		22,146.43
NAV per Unit on 31.03.2013 (date of redemption)		₹34.10
Less:	Gross Redemption Proceeds [22,146.43 Units X ₹34.10]	₹7,55,193.26
	Securities Transaction Tax @ 2%	₹15,103.87
Less:	Net Proceeds	₹7,40,089.39
	Initial Investment	₹5,00,000.00



Total Return for 7 Years	₹2,40,089.39
Annual Return $= \frac{\text{Total Return}}{\text{Initial Investment}} \times \frac{1}{\text{Period of Investment}}$ $= \frac{2,40,089.39}{5,00,000} \times \frac{1}{7 \text{ Years}} = 6.86\%$	6.86%

Note: Since all the units (financial assets) redeemed are held for more than 12 months, all the capital assets under the income tax law, and therefore, gain on their redemption is exempt from units are long term income tax.

Illustration 28.

XXX Mutual Fund (approved Mutual Fund) sponsored open-ended equity oriented scheme "Chankya Opportunity Fund".

There were three plans viz., "S" Dividend Re-investment Plan, "T"-Bonus Plan & "U" - Growth Plan.

At the time of initial Public Offer on 1-4-2002, Mr.Gautam, Mr.Gaurav & Mrs.Ratna, three investors invested ₹1,00,000 each & chosen "T", "U" & "S" Plan respectively.

The history of the Fund is as follows:

Date	Dividend %	Bonus ratio	Net Asset Value per unit (F.V.₹ 10)		
			Plan S	Plan T	Plan U
28-07-2006	20	-	30.70	31.40	33.42
31-03-2007	70	5:4	58.42	31.05	70.05
31-10-2010	40	-	42.18	25.02	56.15
15-03-2011	25	-	46.45	29.10	64.28
31-03-2011	-	1: 3	42.18	20.05	60.12
24-03-20 12	40	1:4	48.10	19.95	72.40
31-07-2012	-	-	53.75	22.98	82.07

[Ignore Education Cess]

On 31st July all three investors redeemed all the balance units.

Calculate annual rate of return to each of the investors.

Consider:

- Long term capital gain is exempt from Income tax.
- Short term capital gain is subject to 10% Income tax.
- Security transaction tax 0.2 percent only on sale / redemption of units.

Solution:

1. Return from Plan S - Dividend Reinvestment for Mrs. Ratna

Under Dividend Reinvestment Plan, the amount of Dividend is reinvested in the business at the prevailing rate.

(a) Statement of Units, Value and Return on Investment

Date	Dividend %	Investment	Rate,	Units	Cum. Units	Value (₹)
(1)	(2)	(3) = Div X Cum. Units	(4)	(5)=(3)÷ (4)	(6)	(7) = (6) X ÷ ₹10
01.04.2002	Initial Offer	1,00,000	10.00	10,000.00	10,000.00	1,00,000
28.07.2006	0.20	20,000 [2x10,000]	30.70	651.47	10,651.47	1,06,515
31.03.2007	0.70	74,560 [7X10,651.47]	58.42	1,276.28	11,927.75	1,19,278
30.10.2010	0.40	47,711 [4x11,927.75]	42.18	1,131.13	13,058.88	1,30,590
15.03.2011	0.25	32,647 [2.5X13,058.88]	46.45	702.85	13,761.73	1,37,617
24.03.2012	0.40	55,047 [4x13,761.73]	48.10	1,144.43	14,906.16	1,49,062
31.07.2012	-	-	53.75		14,906.16	1,49,062

(b) Return on Investment

Particulars	₹
Redemption value 14,906.16 X 53.75	8,01,206.10
Less: Short term capital gain tax @ 10% =1,144.43 units (53.75-48.10) X 10%	646.00
	8,00,560.10
Less: Securities Transaction Tax @ 0.2% [0.2% X 8,01,206.10]	1,602.41
Redemption Value net of Taxes	7,98,957.69
Less: Investment	1,00,000.00
Net Return from Investment	6,98,957.69
Period of Investment [1/4/02 to 31/07/12] in months	124
Annual Average Return	
$= \frac{[\text{Net Return} \times 12 \text{ months} \times 100]}{\text{Purchase Price} \times \text{Period of Investment (months)}}$	
$= \frac{[6,98,957.49 \times 12 \times 100]}{1,00,000 \times 124}$	67.64%

- Short Term Capital Gains is only in respect of Investment made in 24/03/2012 where the period of holding is less than 1 year.
- Securities Transaction Tax is not to be considered for computation of Short term Capital Gains and hence deducted from the net amount to ascertain the Cash Flows.

2. Return from Plan T - Bonus Plan for Mr. Gautam

Under the Bonus Plan, Bonus units are issued in the specified ratio.

(a) Statement of Units, Bonus and Value per unit



Date	Bonus Ratio	Units	Cum. Units	NAV per unit
(1)	(2)	(3)	(4)	(5)
01.04.2002	Initial Issue	10,000	10,000	10
31.03.2007	5:4	12,500 [10,000 x 5 ÷ 4]	22,500	31.05
31.03.2011	1:3	7,500 [22,500 x 1 ÷ 3]	30,000	20.05
24.03.2012	1:4	7,500 [30,000 x 1 ÷ 4]	37,500	95.95

(b) Return on Investment

Particulars	₹
Redemption value 37,500 X 22.98	8,61,750.00
Less: Short term capital gain tax @ 10% = 7,500 X (22.98 - 0) X 10% (See Note (a) below)	17,235.00
	8,44,515.00
Less: Securities Transaction Tax @ 0.2%	1,723.50
Net of tax	8,42,791.50
Less: Investment	1,00,000.00
Net gain	7,42,791.50
Annual Average Return	
= $\frac{[\text{Net Return} \times 12 \text{ months} \times 100]}{\text{Purchase Price} \times \text{Period of Investment (months)}}$	
= $\frac{7,42,719.50 \times 12 \times 100}{1,00,000 \times 124}$	71.88%

Note:

- (a) For Income tax purposes, Cost of Acquisition of Bonus Shares is considered as NIL.
- (b) Short Term Capital Gains is only in respect of Bonus issued on 24/03/2012 as the period of holding is less than 1 year.

3. Return from Plan U - Growth Plan to Mr.Gaurav

Particulars	₹
Redemption value [10,000 X 82.07]	8,20,700.00
Less: Security Transaction Tax (S.T.T) is 0.2%	1,641.40
Net amount received	8,19,058.60
Less: Investment	1,00,000.00
Net gain	7,19,058.60

There is no Short Term Capital Gains as the period of holding is more than '1 year.

Return under CAPM — Same Portfolio Pattern — Adjustment for Alpha

Illustration 29.

Equi-Stable, is a portfolio model where in 20% of Fund Value is invested in Fixed Income Bearing Instruments. The Balance of 80% is divided among Old Industry Stock (Iron and Steel), Automotive Industry Stock, Information Technology Stocks, infrastructure Company Stocks and Financial Services Sector in the ratio of 4:2:6:3:5.

Three mutual funds X, Y and Z, offer a Fund Scheme based on the Equi-Stable Portfolio Model. The actual return on Equi-Stable portfolios of each of the three funds for the past 3 years is as follows —

Year	1	2	3
Portfolio X	17.35%	18.70%	21.60%
Portfolio Y	17.20%	18.25%	22.15%
Portfolio Z	17.10%	18.60%	22.00%

Beta factor of the Equi-Stable portfolio is measured at 1.35. Return on Market Portfolio indicate that ₹1000 invested will fetch ₹153 in an year (including capital appreciation and dividend yield). RBI Bonds, guaranteed by the Central Government yields 4.50%.

Rate the fund managers of X, Y and Z.

Solution:**1. Computation of Expected Rate of Return under CAPM**

$E(R_X) R_F + [B_X \times (R_M - R_F)]$ [Expected Return on portfolio X]

Risk Free Return R_F 4.50% [RBI Bonds]

Return on Market Portfolio R_M 15.30% [Annual Return $\times 153 \div$ Investment $\times ₹1000$]

Beta of Equi-Stable BE 1.35 [Given]

Expected Return of Equi-Stable $E(R_E) = 4.50\% + [1.35 \times (15.30\% - 4.50\%)] = \mathbf{19.08\%}$

2. Computation of Alpha Facto of the 3 Funds

Year	Mutual Fund X		Mutual Fund Y		Mutual Fund Z	
	Actual Return	Abnormal Return $[AR_x]$	Actual Return	Abnormal Return $[AR_y]$	Actual Return	Abnormal Return $[AR_z]$
(1)	(2)	(3) = (1) - $E(R_E)$	(4)	(5) = (4) - $E(R_E)$	(6)	(7) = (6) - $E(R_E)$
1	17.35%	17.35 - 19.08 = (1.73)	17.20%	17.20 - 19.08 = (1.88)	17.10%	17.10 - 19.08 = (1.98)
2	18.70%	18.70 - 19.08 = (0.38)	18.25%	18.25 - 19.08 = (0.83)	18.60%	18.60 - 19.08 = (0.48)
3	21.60%	21.60 - 19.08 = 2.52	22.15%	22.15 - 19.08 = 3.07	22.00%	22.00 - 19.08 = 2.92
		0.41		0.36		0.46

Alpha Factor:

Fund X $\alpha_x = \Sigma AR_x \div n = 0.41 \div 3 \text{ Years} = \mathbf{0.137\%}$

Fund Y $\alpha_y = \Sigma AR_y \div n = 0.36 \div 3 \text{ Years} = \mathbf{0.120\%}$

Fund Z $\alpha_z = \Sigma AR_z \div n = 0.46 \div 3 \text{ Years} = \mathbf{0.153\%}$

Evaluation: Equi-Stable Scheme of Mutual Fund Z has the highest Alpha i.e. it has yielded 0.153% return more than the market expectations, when compared to 0.137% and 0.12% of Fund X and Y. Therefore, Fund Manager of Mutual Fund Z has performed better. Ranking of the fund managers are as follows —



1. → Fund Manager of Z
2. → Fund Manager of X
3. → Fund Manager of Y

Illustration 30.

An aggressive mutual fund promises an expected return of 18 per cent with a possible volatility (standard deviation) of 20 %. On the other hand, a conservative mutual fund promises an expected return of 17 per cent and volatility of 19%.

- (a) Which fund would you like to invest in?
- (b) Would you like to invest in both if you have money?
- (c) Assuming you can borrow money from your provident fund at an opportunity cost of 10 %, which fund you would invest your money in?
- (d) Would you consider both funds if you could lend or borrow money at 10 %?

Solution:

- (a) It depends on your preference and risk-taking attitude.
- (b) You can achieve diversification gains if you invest in both.
- (c) The slopes of the capital market line for two funds are:
 - Aggressive fund = $(18 - 10)/20 = 0.40$; and
 - Conservative fund: $(17-10)/19 = 0.37$. Aggressive fund is preferable.
- (d) Benefits of diversification can be obtained if you invest in both funds and also lend and borrow.

Study Note - 3

COMMODITY EXCHANGE



This Study Note includes

- 3.1 Commodity Exchange
- 3.2 Commodities Exchanges in India
- 3.3 Commodity Exchange - Structure
- 3.4 Indian Commodity Market - Regulatory Framework
- 3.5 Indian Economy and Role of Agricultural Commodity
- 3.6 Unresolved Issues and Future Prospects
- 3.7 Instruments available for Trading
- 3.8 Participants of Commodity Market
- 3.9 Intermediaries of Commodity Markets
- 3.10 Product Specification
- 3.11 How the Commodity Market Works
- 3.12 Clearing House Operations
- 3.13 Risk Management
- 3.14 Basis and Basis Risk
- 3.15 Commodity Futures and its Mechanism
- 3.16 Commonly used terms in Commodity Market

3.1 COMMODITY EXCHANGE

A **commodities exchange** is an exchange where various commodities and derivatives products are traded. Most commodity markets across the world trade in agricultural products and other raw materials (like wheat, barley, sugar, maize, cotton, cocoa, coffee, milk products, pork bellies, oil, metals, etc.) and contracts based on them. These contracts can include spot prices, forwards, futures and options on futures. Other sophisticated products may include interest rates, environmental instruments, swaps, or ocean freight contracts.

Commodities exchanges usually trade futures contracts on commodities, such as trading contracts to receive something, say corn, in a certain month. A farmer raising corn can sell a future contract on his corn, which will not be harvested for several months, and guarantee the price he will be paid when he delivers; a breakfast cereal producer buys the contract now and guarantees the price will not go up when it is delivered. This protects the farmer from price drops and the buyer from price rises.

Speculators and investors also buy and sell the futures contracts in attempt to make a profit and provide liquidity to the system. However, due to the financial leverage provided to traders by the exchange, commodity futures traders face a substantial risk.

A commodity exchange is considered to be essentially public because anybody may trade through its member firms. The commodity exchange itself regulates the trading practices of its members while prices on a commodity exchange are determined by supply and demand.

A commodity exchange provides the rules, procedures, and physical for commodity trading, oversees trading practices, and gathers and disseminates marketplace information. Commodity exchange transactions take place on the commodity exchange floor, in what is called a pit, and must be effected within certain time limits.

History

- Commodity exchanges are one of the oldest forms of commerce. In early economies, people realized that it was useful to talk about general categories of goods, instead of specific products. For example, if a farmer borrowed money and promised to pay back the loan with a cow later, it would be easier to set up the deal if it could be any cow, not a particular cow. If “that cow” could be replaced by “any equivalent cow,” the cow became a commodity.

Once this concept was understood, it was natural to create venues for buying and selling commodities, either immediately or for future delivery. These exchanges formed in large cities with active economies, like London, Amsterdam, New York, and Chicago.

Single-Commodity Exchanges

- Many commodity exchanges exist to trade only a single commodity. This is the most common way for exchanges to start: producers and consumers of a single product (pigs, oil or rice, for example) will set up a regular meeting place and common standards for doing business. Single-commodity exchanges are increasingly rare, because most traders prefer to use an exchange that has more products to trade

Users of Commodity Exchanges

- The main users of commodity exchanges are hedgers and speculators. A hedger is someone who is taking a risk based on the price of a commodity. For example, a power plant might produce power using coal, and sell this power at a fixed price. If coal rose in price, they could be forced to sell at a loss. This producer might buy coal futures in order to profit from those futures if coal prices rose. When a financial transaction leads to a profit that offsets a business loss (or a loss that offsets a business profit), it is known as a hedge. A speculator is simply betting on the direction of prices, without having an underlying business interest

3.1.1 Definition of Commodity

In economics, a **commodity** is a marketable item produced to satisfy wants or needs. Economic commodities comprise goods and services.

The more specific meaning of the term *commodity* is applied to goods only. It is used to describe a class of goods for which there is demand, but which is supplied without qualitative differentiation across a market. Commodity has full or partial fungibility; that is, the market treats its instances as equivalent or nearly so with no regard to who produced them. “From the taste of wheat it is not possible to tell who produced it, a Russian serf, a French peasant or an English capitalist.” Petroleum and copper are other examples of such commodities, their supply and demand being a part of one universal market. Items such as stereo systems, on the other hand, have many aspects of product differentiation, such as the brand, the user interface and the perceived quality. The demand for one type of stereo may be much larger than demand for another.

In contrast, one of the characteristics of a commodity good is that its price is determined as a function of its market as a whole. Well-established physical commodities have actively traded spot and derivative markets. Generally, these are basic resources and agricultural products such as iron ore, crude oil, coal, salt, sugar, tea, coffee beans, soybeans, aluminum, copper, rice, wheat, gold, silver, palladium, and platinum. Soft commodities are goods that are grown, while hard commodities are the ones that are extracted through mining.



There is another important class of energy commodities which includes electricity, gas, coal and oil. Electricity has the particular characteristic that it is usually uneconomical to store; hence, electricity must be consumed as soon as it is produced.

3.1.2 Global commodities trading company

This is a list of giant commodities trading companies who operate worldwide.

- a) Vitol
- b) Glencore International AG
- c) Trafigura
- d) Cargill
- e) Archer Daniels Midland
- f) Gunvor (company)
- g) Mercuria Energy Group
- h) Noble Group
- i) Louis Dreyfus Group
- j) Bunge Limited
- k) Wilmar International
- l) Olam International

3.1.3 Global Commodity Exchanges

- a) New York Mercantile Exchange (NYMEX)
- b) London Metal Exchange (LME)
- c) Chicago Board of Trade (CBOT)
- d) New York Board of Trade (NYBOT)
- e) Kansas Board of Trade
- f) Winnipeg Commodity Exchange, Manitoba
- g) Dalian Commodity Exchange, China
- h) Bursa Malaysia Derivatives exchange
- i) Singapore Commodity Exchange (SICOM)
- j) Chicago Mercantile Exchange (CME), US
- k) London Metal Exchange
- l) Tokyo Commodity Exchange (TOCOM)
- m) Shanghai Futures Exchange
- n) Sydney Futures Exchange
- o) London International Financial Futures and Options Exchange (LIFFE)
- p) Dubai Gold & Commodity Exchange (DGCX)
- q) Dubai Mercantile Exchange (DME), (joint venture between Dubaiholding and the New York Mercantile Exchange (NYMEX))

Commodity Market Structure Spot Market



Global Commodities Market

3.2 COMMODITIES EXCHANGES IN INDIA

3.2.1 History of Commodity Market in India

The history of organized commodity derivatives in India goes back to the nineteenth century when Cotton Trade Association started futures trading in 1875, about a decade after they started in Chicago. Over the time derivatives market developed in several commodities in India. Following Cotton, derivatives trading started in oilseed in Bombay(1900), raw jute and jute goods in Calcutta (1912), Wheat in Hapur (1913) and Bullion in Bombay (1920). However many feared that derivatives fuelled unnecessary speculation and were detrimental to the healthy functioning of the market for the underlying commodities, resulting in to banning of commodity options trading and cash settlement of commodities futures after independence in 1952. The parliament passed the Forward Contracts (Regulation) Act, 1952, which regulated contracts in Commodities all over the India. The act prohibited options trading in Goods along with cash settlement of forward trades, rendering a crushing blow to the commodity derivatives market. Under the act only those associations/ exchanges, which are granted reorganization from the Government, are allowed to organize forward trading in regulated commodities. The act envisages three tier regulations:

- (i) Exchange which organizes forward trading in commodities can regulate trading on day-to-day basis;
- (ii) Forward Markets Commission provides regulatory oversight under the powers delegated to it by the central Government.



- (iii) The Central Government- Department of Consumer Affairs, Ministry of Consumer Affairs, Food and Public Distribution- is the ultimate regulatory authority.

After Liberalization and Globalization in 1990, the Government set up a committee (1993) to examine the role of futures trading. The Committee (headed by Prof. K.N.Kabra) recommended allowing futures trading in 17 commodity groups. It also recommended strengthening Forward Markets Commission, and certain amendments to Forward Contracts (Regulation) Act 1952, particularly allowing option trading in goods and registration of brokers with Forward Markets Commission. The Government accepted most of these recommendations and futures' trading was permitted in all recommended commodities. It is timely decision since internationally the commodity cycle is on upswing and the next decade being touched as the decade of Commodities. Commodity exchange in India plays an important role where the prices of any commodity are not fixed, in an organized way.

Commodity exchanges in India play a crucial role in India's economic development and growth. If price of any commodity is not fixed then commodity exchanges determines the price of that particular commodity in an organized way. The price is determined examining right from grassroots level and it goes through producers, retail investors and even end-users. Commodity exchanges have brought Indian buyers and seller in an equal importance to trade and to do business swiftly.

3.2.2 Commodity Market in India – Present Position

Today, commodity exchanges are purely speculative in nature. Before discovering the price, they reach to the producers, endusers, and even the retail investors, at a grassroots level. It brings a price transparency and risk management in the vital market. By Exchange rules and by law, no one can bid under a higher bid, and no one can offer to sell higher than someone else's lower offer. That keeps the market as efficient as possible, and keeps the traders on their toes to make sure no one gets the purchase or sale before they do. Since 2002, the commodities future market in India has experienced an unexpected boom in terms of modern exchanges, number of commodities allowed for derivatives trading as well as the value of futures trading in commodities, which crossed \$ 1 trillion mark in 2006. In India there are 25 recognized future exchanges, of which there are four national level multi-commodity exchanges. After a gap of almost three decades, Government of India has allowed forward transactions in commodities through Online Commodity Exchanges, a modification of traditional business known as Adhat and Vayda Vyapar to facilitate better risk coverage and delivery of commodities.

THE FOUR EXCHANGES ARE:

- (i) National Commodity & Derivatives Exchange Limited (NCDEX) Mumbai,
- (ii) Multi Commodity Exchange of India Limited (MCX) Mumbai and
- (iii) National Multi- Commodity Exchange of India Limited (NMCEIL), Ahmedabad.
- (iv) Indian Commodity Exchange Limited (ICEX), Gurgaon

There are other regional commodity exchanges situated in different parts of India.

3.2.3 National Level Commodity Exchanges in India

3.2.3.1 NMCE (National Multi Commodity Exchange of India Ltd.)

NMCE is the first demutualised electronic commodity exchange of India granted the National exchange on Govt. of India and operational since 26th Nov, 2002.

Promoters of NMCE are, Central warehousing corporation (CWC), National Agricultural Cooperative Marketing Federation of India (NAFED), Gujarat Agro-Industries Corporation Limited (GAICL), Gujarat state agricultural Marketing Board (GSAMB), National Institute of Agricultural Marketing (NIAM) and Neptune Overseas Ltd. (NOL). Main equity holders are PNB.

The Head Office of NMCE is located in Ahmedabad. There are various commodity trades on NMCE Platform including Agro and non-agro commodities.

3.2.3.2 National Commodity & Derivatives Exchange Limited (NCDEX)

National Commodity & Derivatives Exchange Limited (NCDEX) is a professionally managed online multi commodity exchange promoted by ICICI Bank Limited (ICICI Bank), Life Insurance Corporation of India (LIC), National Bank for Agriculture and Rural Development (NABARD) and National Stock Exchange of India Limited (NSE). Punjab National Bank (PNB), CRISIL Limited (formerly the Credit Rating Information Services of India Limited), Indian Farmers Fertilizer Cooperative Limited (IFFCO) and Canara Bank by subscribing to the equity shares have joined the initial promoters as shareholders of the Exchange. NCDEX is the only commodity exchange in the country promoted by national level institutions. This unique parentage enables it to offer a bouquet of benefits, which are currently in short supply in the commodity markets. The institutional promoters of NCDEX are prominent players in their respective fields and bring with them institutional building experience, trust, nationwide reach, technology and risk management skills.

NCDEX is a public limited company incorporated on April 23, 2003 under the Companies Act, 1956. It obtained its Certificate for Commencement of Business on May 9, 2003. It has commenced its operations on December 15, 2003.

NCDEX is a nation-level, technology driven de-mutualized on-line commodity exchange with an independent Board of Directors and professionals not having any vested interest in commodity markets. It is committed to provide a world-class commodity exchange platform for market participants to trade in a wide spectrum of commodity derivatives driven by best global practices, professionalism and transparency.

NCDEX is regulated by Forward Market Commission in respect of futures trading in commodities. Besides, NCDEX is subjected to various laws of the land like the Companies Act, Stamp Act, Contracts Act, Forward Commission (Regulation) Act and various other legislations, which impinge on its working.

NCDEX is located in Mumbai and offers facilities to its members in more than 390 centers throughout India. The reach will gradually be expanded to more centers.

NCDEX currently facilitates trading of thirty six commodities - Cashew, Castor Seed, Chana , Chilli, Coffee, Cotton, Cotton Seed Oilcake, Crude Palm Oil, Expeller Mustard Oil, Gold, Guar gum, Guar Seeds, Gur, Jeera, Jute sacking bags, Mild Steel Ingot, Mulberry Green Cocoons, Pepper, Rapeseed - Mustard Seed ,Raw Jute, RBD Palmolein, Refined Soy Oil, Rice, Rubber, Sesame Seeds, Silk, Silver, Soy Bean, Sugar, Tur, Turmeric, Urad (Black Matpe), Wheat, Yellow Peas, Yellow Red Maize & Yellow Soybean Meal. At subsequent phases trading in more commodities would be facilitated.

The above does indicate that the commodity derivatives market has a bright future in India. The volume and value of trade in commodity derivatives could in fact take a quantum jump as bullion, crude oil and other high value commodities being added with each passing day get more actively traded in the coming months. It is also being speculated by market operators that finally the commodity derivatives market would out-pace and overtake the market for stock derivatives.

The Exchange facilitates trading in an array of over 45 commodity contracts, both agricultural and non-agricultural. With over 830 members, trading is conducted in more than 35,000 terminals across 700 centers in India. It also facilitates delivery of commodities through a network of over 775 delivery centers with a holding capacity of around 1.3 million tonnes.



Shareholders

The shareholders of NCDEX include several large national level institutions and public sector banks. This unique parentage enables it to offer a bouquet of benefits and services. The shareholders bring with them expertise in areas of agriculture, banking with focus on rural finance, commodity and stock markets, physical markets, investment banking and institution building

- Jaypee Capital Services Limited
- Shree Renuka Sugars Limited
- Life Insurance Corporation of India (LIC)
- National Bank for Agriculture and Rural Development (NABARD)
- National Stock Exchange of India Limited (NSE)
- Indian Farmers Fertiliser Cooperative Limited (IFFCO)
- Punjab National Bank (PNB)
- Canara Bank
- CRISIL Limited
- Goldman Sachs Investments (Mauritius) Limited
- Intercontinental Exchange Holdings (ICE)
- Build India Capital Advisors LLP

Products

NCDEX currently offers an array of over 45 different commodity contracts for trading. The commodity segments covered are Agri-commodities, Bullion, Energy and Metals (Ferrous & Non Ferrous Metals).

These commodities have been introduced by the Exchange after thorough research into the characteristics of the product and approval by the Forward Markets Commission, the Regulator for commodity exchanges in the country.

Price Dissemination

The exchange is actively engaged in disseminating the prices of various commodities across India. During the last two years, NCDEX jointly with Forward Markets Commission has been installing Electronic Price Display Boards at Mandis and KVKs in various states, as a part of the Price Dissemination Project, under XI Five year Plan. The Price ticker boards display both Spot and Future prices of various commodities, getting its on-line Data feed from all the Commodity Future exchanges and AGMARKNET, which help Farmers to take informed decisions on crop selection and Marketing strategies.

Risk Management

The Exchange has a robust risk management framework and a multi-tiered structure comprising stringent criteria pertaining to net worth & base capital requirements, limits, contract life cycle margins, price circuit filters, daily mark-to-market and other triggers. Position monitoring at member level is carried out by the Exchange on a real-time basis and margins are recalculated at specific intervals to capture intra-day volatility.

Market Watch and Surveillance

Internal Market Surveillance systems handle all the critical elements of the surveillance process and provide a robust monitoring and warning mechanism. This process is aided by the surveillance system

which generates various alerts and online critical reports related to price, volume and open interest (OI) violations at member / client level.

Clearing and Settlement

Clearing and Settlement is one of the most important functions involved in commodity trading.. Through this function, the Exchange ensures daily MTM settlement and settlement at expiry, of both funds and commodities and guarantees the performance of the parties to each transaction.

Only clearing members are entitled to clear and settle contracts through the clearing house. At NCDEX, after the trading hours on the contract expiry dates, based on the available information, the matching for deliveries takes place.

Compliance

NCDEX is regulated by the Forward Market Commission in respect of futures trading in commodities, under the Forward Contracts (Regulation) Act. Besides, NCDEX is subjected to various laws of the land like the Companies Act, Stamp Act, Contracts Act, and various other relevant legislations.

The Exchange is the first tier of regulation in the regulatory structure. The compliance functions of the Exchange ensure that the Exchange operates within the framework of the extant legal provisions and also oversee the compliance by its members. There are various compliance requirements at member level including for protection of clients, and the compliance level of members is overseen through member inspections and requirements of reporting.

Technology

NCDEX has enabled all operations in the Exchange using the state of the art technology with complete automation of related processes. From the most basic and initial setting up of systems to trade, the enabling of trading to the final settlement of trades, everything is technology enabled. Members and their clients connect to the Exchange through leased lines, Satellite based very small aperture terminals (VSATs) and Internet. The exchange has also been at the forefront with developing innovative tools, such as NCharts - an advanced charting tool, which are beneficial to the trading community

Customer Service

Customer service group provides a single window for handling queries, training and redress of grievances of members, their clients and other market participants. This consists of a large number of dedicated executives whose response time for customer issues is well defined and followed meticulously.

Knowledge Management

Knowledge Management team provides regular insights into the behaviour of various commodities through periodic research reports which are circulated on daily/ monthly basis. These reports are widely used by market participants, academicians and policy makers. Other than the reports, members of the Knowledge Management also contribute articles to the media as well as other journals by way of creating awareness among people about commodity markets. Additionally, periodic updates from the global commodity sector are transmitted across the markets given that the correlation between global and domestic prices has strengthened over the years. The team also participates in various training programs in colleges and elsewhere conducted for increasing awareness among members as well as others about commodity markets and derivatives.

Education and Certification

The Exchange has been conducting awareness programs across the country to highlight the opportunities in the commodity space, which have been very well received. These programmes are at different levels: members, farmers (jointly with FMC), associations like CII, ASSOCHAM, FICCI, IMC, BCCI, media, students etc.



The Exchange provides two alternative certification options for prospective candidates. The certification provided by NSE's Certification in Financial Markets (NCFM) was the first of its kind in the country which was introduced in 2004. Further, in 2008, NCDEX Institute for Commodity Markets & Research (NICR) launched an e-learning module on commodity futures, which is again the first of its kind in the country. Both these certificates are co-branded with NCDEX. The Exchange also provides inputs in courses in several educational institutions across the country.

3.2.3.3 Multi-Commodity Exchange of India Limited (MCX)

MCX an independent and de-mutualized multi commodity exchange has permanent recognition from Government of India for facilitating online trading, clearing and settlement operations for commodity futures markets across the country. Key shareholders of MCX are Financial Technologies (India) Ltd., State Bank of India, NABARD, NSE, HDFC Bank, State Bank of Indore, State Bank of Hyderabad, State Bank of Saurashtra, SBI Life Insurance Co. Ltd., Union Bank of India, Bank Of India, Bank Of Baroda, Canara Bank, Corporation Bank.

Headquartered in Mumbai, MCX is led by an expert management team with deep domain knowledge of the commodity futures markets. Through the integration of dedicated resources, robust technology and scalable infrastructure, since inception MCX has recorded many first to its credit.

Inaugurated in November 2003 by Shri Mukesh Ambani, Chairman & Managing Director, Reliance Industries Ltd, MCX offers futures trading in the following commodity categories: Agri Commodities, Bullion, Metals- Ferrous & Non-ferrous, Pulses, Oils & Oilseeds, Energy, Plantations, Spices and other soft commodities.

MCX has built strategic alliances with some of the largest players in commodities eco-system, namely, Bombay Bullion Association, Bombay Metal Exchange, Solvent Extractors' Association of India, Pulses Importers Association, Shetkari Sanghatana, United Planters Association of India and India Pepper and Spice Trade Association.

Today MCX is offering spectacular growth opportunities and advantages to a large cross section of the participants including Producers / Processors, Traders, Corporate, Regional Trading Centers, Importers, Exporters, Cooperatives, Industry Associations, amongst others MCX being nation-wide commodity exchange, offering multiple commodities for trading with wide reach and penetration and robust infrastructure, is well placed to tap this vast potential.

3.2.3.4 ICEX (Indian Commodity Exchange Ltd.)

ICEX is latest commodity exchange of India Started Function from 27 Nov, 09. It is jointly promote by India bulls Financial Services Ltd. and MMTC Ltd. and has Indian Potash Ltd. KRIBHCO and IFC among others, as its partners having its head office located at Gurgaon (Haryana).

NCMSL

The National Collateral Management Services Limited (NCMSL) is the country's leading organization providing a bouquet of services along the entire supply chain in the commodity space. Through pan India presence, NCMSL provides commodity handling and risk management services to clients across the country.

Our Shareholders

Our shareholders are reputed banks & national and international institutions. These are IFFCO, Rabo Equity, International Finance Corporation, Karur Vysya Bank, NCDEX, HAFED, Punjab National Bank, Corporation Bank, Bank of India, Canara Bank, HDFC Bank, Yes Bank, Indian Bank, Audit Control and Expertise (ACE), Geneva. There is no individual shareholding in NCMSL.

Vision

To be the most trusted and innovative risk manager and supply chain solution provider for commodities and inventories.

Services

Storage & Preservation

NCMSL offers modern, scientific and IT enabled storage and preservation services for the entire range of commodities. Our 700+ warehouses spread across the country issue credible and reliable warehouse receipts. The Company is also in the process of setting up its own warehouse complexes in 12 States across the country. The warehouses are accredited by the National Commodity and Derivatives Exchange (NCDEX) for accepting physical deliveries of commodities traded in the commodity futures market. Warehouses are also getting accredited to the Warehousing Development and Regulation Authority for issue of negotiable warehouse receipts.

Our warehouses are manned by qualified and professional staff. Each of our warehouses serve as commodity multi link points (CMPs) providing a package of services, including dematerialization and materialization of physical stocks of commodities, testing & certification and funding against warehouse receipts. We are present in 16 states and deal with as many as 42 agricultural commodities. NCMSL also offers storage and logistics services for non-agricultural commodities and inventories. Our warehouses are connected to a centralized database which enables us to meet all the requirements of clients, across India, including an on-line MIS.

Procurement and Supply Chain

Our procurement and supply chain team consists of agri-professionals with experience in handling agricultural commodities in various parts of the country and we offer end to end procurement and related supply chain services to bulk consumers and large end users. NCMSL was the first private procurement agency engaged by the Government of India (GOI) to procure commodities under the Minimum Support Price (MSP) operations. Many small and large entities have found it convenient to utilize our composite services of sourcing, warehousing and quality verification under a single roof.

Collateral Management

NCMSL has been a pioneer in providing collateral management services to banks. These services have assisted industries, traders and farmers in financing their capital requirement at various stages of the supply chain ranging from pre-harvesting to the marketing and export stages. We also offer premium services for working capital financing in commodity-based industries, especially agro-based industries. NCMSL also provides warehouse receipt financing for commodities stored in its warehouses. Our services also cover structured trade finance products, stock audits, monitoring and inspection at diverse locations across the country.

Market Intelligence

We provide incisive market intelligence on the entire range of commodities traded in the country. Our pragmatic solutions based on assessment of existing resources, identification of problems and critical evaluation of various alternatives distinguish us from peers and other market players in the country. Our market intelligence division works with specialized teams in the following areas to provide client specific solutions:

- Price intelligence
- Commodity intelligence
- Trade intelligence

Weather and Crop Intelligence

We are actively engaged in setting up Automatic Weather Stations (AWS) across the length and breadth



of the country to provide weather intelligence to financial institutions for facilitating weather insurance products in the country. At present we have over 1100 automatic weather stations across 14 States. We also assess standing crop condition, acreage and forecast yield using simulation models, remote sensing and GIS Technologies.

Testing and Certification

Our testing and certification services functions under the brand name of CommGrade. In the short time since its establishment in August 2005, CommGrade has acquired a nationwide reputation of trustworthiness and integrity for its testing and certification services. The use of world-class equipments coupled with professional expertise and state of the art laboratory facilities across the country help us deliver zero error and quick test results for the following products:

- Agricultural products (spices and condiments, cereals & pulses, oil seeds, nuts, food grains and rice)
- All food products (raw, finished, tinned/canned)
- Sugar and sugar-based confectionary products
- Tea, coffee, instant coffee and its products
- Fruits, vegetables and their products
- Milk and milk products
- Marine foods
- Oils and fats
- Water & beverages

The integrity of our processes has earned us quality certification from TUV for implementing Quality Management System as per ISO 9001:2000. Our central lab has accreditation from National Accreditation Board for Testing and Calibration Laboratories (NABL) and successfully implementing ISO 17025:2005. Spices Board of India, under the Ministry of Commerce has also recognized and accredited CommGrade lab for testing spices and condiments. CommGrade holds professional membership of American Association for Clinical Chemistry (AACC), Association of Analytical Commodities (AOAC), Association of Microbiologists of India (AMI) and Association of Food Scientists and Technologists India (AOFST). Our central laboratory located at Hyderabad has all the required sophisticated equipment and state of the art facilities. In addition, we have seven well-equipped labs across the country at Jodhpur, Karnal, Unjha, Bikaner, Sriranganganagar, Kochi and Gandhidham.

3.2.4 Unique Features of National Level Commodity Exchanges

The unique features of national level commodity exchanges are:

- They are demutualized, meaning thereby that they are run professionally and there is separation of management from ownership. The independent management does not have any trading interest in the commodities dealt with on the exchange.
- They provide online platforms or screen based trading as distinct from the open-out-cry systems (ring trading) seen on conventional exchanges. This ensures transparency in operations as everyone has access to the same information.
- They allow trading in a number of commodities and are hence multi-commodity exchanges.
- They are national level exchanges which facilitate trading from anywhere in the country. This corollary of being an online exchange.

3.2.5 Indian Commodity Market- set for paradigm shift

- (i) Four licenses recently issued by Govt. of India to set- up National online Multi Commodity Exchanges – to ensure a transparent price discovery and risk management mechanism;
- (ii) List of commodities for futures trade – increased from 11 in 1990 to over 100 in 2003;
- (iii) Reforms with regards to sale, storage and movement of commodities initiated;
- (iv) Shift from administered pricing to free market pricing- WTO regime;
- (v) Overseas hedging has been allowed in metals;
- (vi) Petro-products marketing companies have been allowed to hedge prices;
- (vii) Institutionalization of agriculture.

3.2.6 Why are Commodity Derivatives Required?

India is among the top-5 producers of most of the commodities, in addition to being a major consumer of bullion and energy products. Agriculture contributes about 22% to the GDP of the Indian economy. It employs around 57% of the labor force on a total of 163 million hectares of land. Agriculture sector is an important factor in achieving a GDP growth of 8-10%. All this indicates that India can be promoted as a major center for trading of commodity derivatives.

It is unfortunate that the policies of FMC during the most of 1950s to 1980s suppressed the very markets it was supposed to encourage and nurture to grow with times. It was a mistake other emerging economies of the world would want to avoid. However, it is not in India alone that derivatives were suspected of creating too much speculation that would be to the detriment of the healthy growth of the markets and the farmers. Such suspicions might normally arise due to a misunderstanding of the characteristics and role of derivative product.

It is important to understand why commodity derivatives are required and the role they can play in risk management. It is common knowledge that prices of commodities, metals, shares and currencies fluctuate over time. The possibility of adverse price changes in future creates risk for businesses. Derivatives are used to reduce or eliminate price risk arising from unforeseen price changes. A derivative is a financial contract whose price depends on, or is derived from, the price of another asset. Two important derivatives are futures and options.

(i) Commodity Futures Contracts: A futures contract is an agreement for buying or selling a commodity for a predetermined delivery price at a specific future time. Futures are standardized contracts that are traded on organized futures exchanges that ensure performance of the contracts and thus remove the default risk. The commodity futures have existed since the Chicago Board of Trade (CBOT, www.cbot.com) was established in 1948 to bring farmers and merchants together. The major function of futures markets is to transfer price risk from hedgers to speculators. For example, suppose a farmer is expecting his crop of wheat to be ready in two months time, but is worried that the price of wheat may decline in this period. In order to minimize his risk, he can enter into a futures contract to sell his crop in two months' time at a price determined now. This way he is able to hedge his risk arising from a possible adverse change in the price of his commodity.

(ii) Commodity Options contracts: Like futures, options are also financial instruments used for hedging and speculation. The commodity option holder has the right, but not the obligation, to buy (or sell) a specific quantity of a commodity at a specified price on or before a specified date. Option contracts involve two parties – the seller of the option writes the option in favour of the buyer (holder) who pays a certain premium to the seller as a price for the option. There are two types of commodity options: a 'call' option gives the holder a right to buy a commodity at an agreed price, while a 'put' option gives



the holder a right to sell a commodity at an agreed price on or before a specified date (called expiry date).

The option holder will exercise the option only if it is beneficial to him; otherwise he will let the option lapse. For example, suppose a farmer buys a put option to sell 100 Quintals of wheat at a price of ₹ 1250 per quintal and pays a 'premium' of ₹ 25 per quintal (or a total of ₹2500). If the price of wheat declines to say ₹1000 before expiry, the farmer will exercise his option and sell his wheat at the agreed price of ₹ 1250 per quintal. However, if the market price of wheat increases to say ₹ 1500 per quintal, it would be advantageous for the farmer to sell it directly in the open market at the spot price, rather than exercise his option to sell at ₹ 1250 per quintal.

Futures and options trading therefore helps in hedging the price risk and also provide investment opportunity to speculators who are willing to assume risk for a possible return. Further, futures trading and the ensuing discovery of price can help farmers in deciding which crops to grow. They can also help in building a competitive edge and enable businesses to smoothen their earnings because non-hedging of the risk would increase the volatility of their quarterly earnings. Thus futures and options markets perform important functions that cannot be ignored in modern business environment. At the same time, it is true that too much speculative activity in essential commodities would destabilize the markets and therefore, these markets are normally regulated as per the laws of the country.

3.2.7 Fundamental Factors

There are various fundamentals factors that drive the commodity markets. These fundamentals may be different for different commodities based on its characteristics. There are certain important fundamentals that apply to all commodities either directly or indirectly.

(a) Demand & supply

Demand and supply are basic factors that affect the movement of any commodity prices. The law of demand and supply is same for equity as well as commodity markets. However demand and supply of all commodities vary during different time periods depending upon seasons, domestic and global conditions and various other major factors influencing its characteristics.

(b) Demand Curve

It is refined form of demand analysis. Demand curve in a laymen's term is a graphical representation of demand over a period of time. Price is represented on y-axis and demand on the x-axis. The graph is a line graph representing demand at particular prices over a period of time. It gives a clear understanding of the demand situation over a period of time at various price levels.

(c) Global and domestic economy

Economic scenario significantly affects the prices of a commodity. Demand and supply of any commodity has a direct relationship with economic condition in the state. Depending upon the nature of the commodity, global and domestic economic scenarios affect the commodity prices. For e.g.; Steel prices highly depend on global economic factors as this is a globally and massively used commodity. However as far as a commodity like Kapas (cotton beans) is concerned global factors affect less when compared to domestic factors.

(d) Economic growth

Economic growth of the world as well as the domestic economy is an important fundamental that will affect the demand and supply positions in a country. If the country is growing at a fast rate the consumption level will also be at a higher rate. This will increase the demand on one hand but supply may not increase at the same rate as it takes time to set up new industries and increase production. This drives the commodity prices of all major commodities.

(e) Inflation

Commodities are considered as hedge against inflation because unlike equity, commodity prices move in direction of inflation. With increase in inflation the prices of major commodities tend to increase and it is true the other way as well.

(f) Geo-political concerns

Political factors have a direct as well as indirect effect on commodity prices. For example if we take the case of Potato when one year back it was barred from trading on the exchanges. However at time political factors can have positive effects as well.

(g) Major Economic Indicators

The Gross Domestic Product, Industrial Production, Purchasing Managers Index ,Durable Goods, Housing data, Unemployment Data, Retail Sales, Producer Price Index , Consumer Price Index, Interest Rate, Consumer Confidence Index etc.

(h) Extra-ordinary events

There may be certain extra-ordinary factors that do not occur very frequent. Wars, natural calamities, depression etc. are such events that affect the commodity prices in a dramatic way.

(i) Speculation

Speculators bring information into system at times fake or over hyped in-order to trigger the price movement in a particular direction. Speculators are though a part of technical analysis but it is important in the matter of fact that speculation may be of some fundamental factors. However they are an important part of the market's price discovery mechanism.

3.2.8 Commodity Exchange in India - Characteristics

- **There is no value-adding process performed on commodity items.** A unit of one type of commodity is broadly interchangeable with another unit. This allows the units to be traded on exchanges without prior inspection.
- **Commodities are produced “naturally” which means that each commodity is subject to unique supply factors.** For example, the production of coffee is affected by the weather, while that of copper is affected by availability of ore. The supply of oil is subject to a great deal of disruptions including wars, geopolitical uncertainty, accidents, or transport issues.
- **Commodities are subject to cycles in demand from both intermediate players and end users.** High prices usually lead to a boost in resource investments causing excess supply in the future which eventually pushes down commodity prices.
- **Commodities from different groups can often exhibit negative correlation at any point of time.** For example, the prices of wheat and aluminum can move in the opposite direction as they are affected by a different set of factors.
- **Commodity prices are positively correlated with growth measures,** although there may be a significant lag between a pickup in industrial production and commodity prices.
- **Commodities generally exhibit positive correlation with inflation indicators.** In particular, commodities tend to react to an early stage of inflation as raw material price appreciation generally tends to precede, and quite often exceed consumer price inflation growth. While true over the very long term, the relationship between inflation and commodity prices has been considerably weaker over the last 10 years, which has been characterized by disinflation/low inflation.



- The above characteristics may not be true for all commodities taken individually; however they are true for diversified indices of industrial commodities and agricultural commodities.

3.2.9 Benefits of Commodity Trading

The world is witnessing a new trend wherein developing countries like India, China, Brazil & other emerging markets are driving the global economy with their rising domestic consumption patterns. This sustained increase in consumption has led to investment analysts realizing the growth potential of a new asset class namely Commodities.

Commodities have also evolved as an asset class with the development of various commodity future indices. The performance of commodities as an asset class is usually measured by the returns on a commodity index, such as the Rogers International Commodity Index (RICI), which tracks the return in 36 different commodity products. In the last 9 years, the RICI Index has given compounded annualized returns of **18.31%** as compared to **17.22%** returns given by BSE SENSEX

a) Strong Performance Track Record: The table alongside reflects positive performance of RICI Index during falling & rising market phases. In fact, the RICI INDEX has outperformed all other indices since 1999.

Indices	Falling Market	Flat Market	Rising Market	Year to Date	Since 1999
	(2000-2001)	2002	(2003-2007)		(1999-till date)
SENSEX	-34.55%	4.04%	490.68%	-17.32%	443.94%
MSCI Emerging Markets	-28.06%	-8.55%	249.98%	*3.23%	274.04%
MSCI APAC ex-Japan	-27.57%	-8.12%	181.81%	-7.09%	162.32%
MSCI WORLD	-22.13%	-21.00%	73.74%	-4.02%	31.50%
RICI INDEX	13.50%	33.26%	109.90%	20.16%	454.83%

Note: RICI Index - The Rogers International Commodity Index is acting as a proxy for commodity asset class. All above returns are in INR and in absolute terms (Source: Bloomberg as on 23rd April 2008)

b) Portfolio Diversification: Adding commodities to your investment portfolio helps you take advantage of the benefit of diversification. In a diversified portfolio, assets do not move in sync with each other, as commodities exhibit low/ negative correlation with respect to equity and bonds. Low/ negative correlation means commodities can play an important role in portfolio diversification by reducing overall portfolio risk. This should improve the consistency of returns over time.

Correlation Coefficient	1999	2000	2001	2002	2003	2004	2005	2006	2007
Equity	-0.04	-0.08	-0.16	0.06	0.002	-0.08	0.13	0.21	0.09
Bond	0.14	0.09	-0.12	-0.04	-0.02	-0.07	0.01	0.03	-0.02

Correlation coefficients of RICI Index (Commodities) with respect to Equities and Bonds

Note: CRISIL Fund-dx which tracks debt mutual fund returns has been used to represent bond asset class, while BSE Sensex has been used to represent equity asset class (Source: Bloomberg & CRISIL Investment Manager)

c) Inflation Hedge: Commodities tend to react to changing economic fundamentals in ways that are different from traditional financial assets. For example, commodities are one of the few asset classes that tend to benefit from rising inflation. As demand for goods and services increases, the

price of those goods and services usually rises as well, so do the prices of the commodities that are used to produce those goods and services. Since commodity prices usually rise when inflation is

accelerating, investing in commodities may provide portfolios with a hedge against inflation. As shown in the table overleaf, commodity has a positive sensitivity to inflation as compared to asset classes like stocks and bonds.

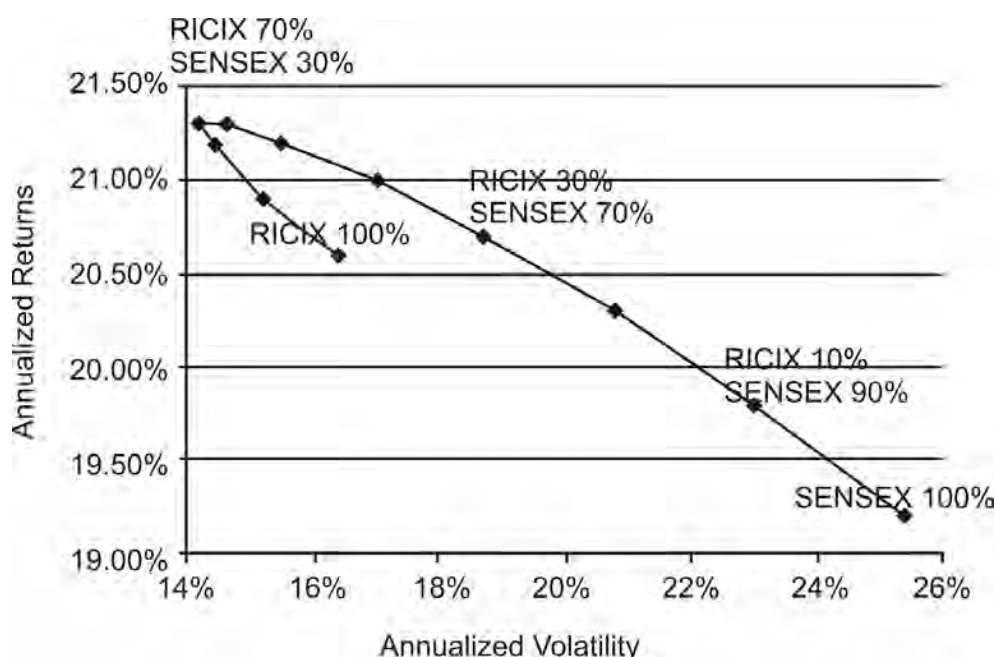
Inflation Sensitivity

	Stocks	Bonds	Commodity
Monthly	-0.10	-0.10	0.09
Quarterly	-0.19	-0.30	0.28
Semi-Annually	-0.04	-0.53	0.43
Annually	-0.02	-0.03	0.49

Stocks: S&P500, Bonds : Lehman Aggregate Bond Index, Rogers International Commodity Index Date 31.12.1999 - 31.12. 2007, Source: Mirae Asset MAPS

d) Role of Commodities in Optimizing Portfolio Returns

An exposure to commodities in your portfolio can help you optimize its returns considerably. The graph below indicates how with a prudent mix of commodity and SENSEX stocks in a portfolio, one could enhance portfolio returns while at the same time reducing the volatility of investments.



(Source: Bloomberg, data calculated from 1st Jan 1999 to 11th Apr 2008)

3.2.10 Commodity Market - Participants

There are two basic types of participants in commodities markets—hedgers and speculators. Hedgers seek to minimize and manage price risk, while speculators take on risk in the hope of making a profit.

As an example of a hedger, you might be a large corn farmer wanting to sell your product at the highest possible price. However, unpredictable weather may create risk, as well as excess supply that could drive prices down. You could take a short position in corn futures, and if prices fall, you could then buy back the futures at a lower price than you previously had sold them. This would help you



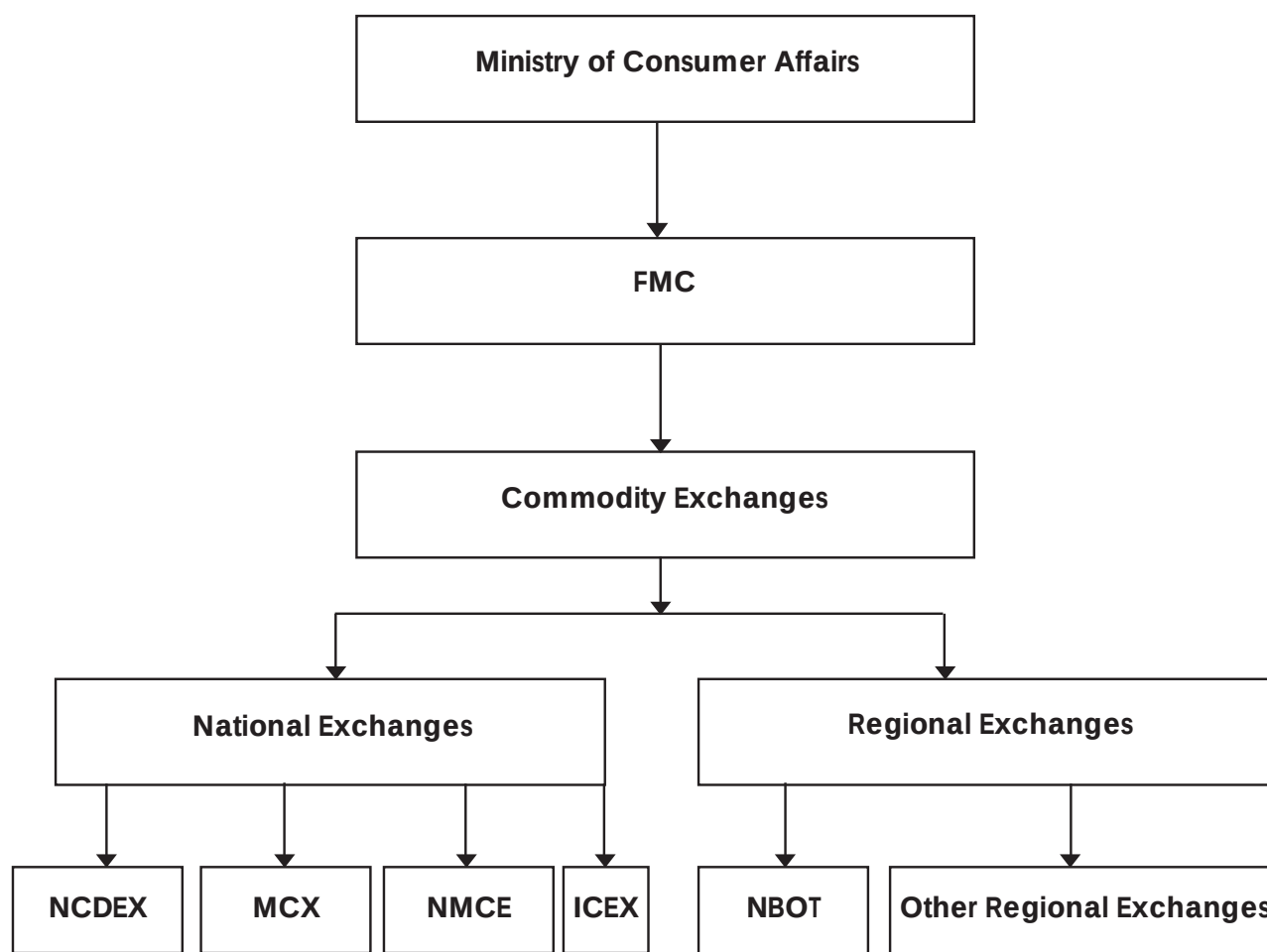
offset the loss from your cash crop and help minimize your risk. Of course, if prices rose, you'd lose money on the futures transaction, but the idea is to use futures as a hedge.

A speculator—including individual investors and professionals such as hedge funds or managed futures traders, could take the opposite side of the hedger's futures transaction. That participant would bear the risk that prices are going to rise in hopes of generating a profit on the long futures position. Most likely, this type of speculator has no actual stake in the business, other than futures trading. A commercial food producer in need of the raw product (a breakfast cereal processor, for example) may also take the other side of the short hedger's trade to offset the risk of paying higher prices for the commodity. If the price of corn rises, the commercial food producer could still capture a profit from the futures position, even though he'd be paying more for the actual corn.

An individual trader who commits his or her own capital to act as speculator on a particular exchange provide market liquidity by constantly buying and selling throughout the trading session and are viewed as important participants in the market by shouldering risk. While the term local has been used to designate those trading in the open-outcry markets, this era of electronic trading is making the phrase a little obsolete. However, their function as liquidity providers is equally important in electronic markets.

3.3 COMMODITY EXCHANGE – STRUCTURE

Broadly, the commodities market exists in two distinct forms—the over-the-counter (OTC) market and the exchange based market. Further, as in equities, there exists the spot and the derivatives segments. Spot markets are essentially OTC markets and participation is restricted to people who are involved with that commodity, such as the farmer, processor, wholesaler, etc. A majority of the derivatives trading takes place through the exchange-based markets with standardized contracts, settlements, etc. The exchange-based markets are essentially derivative markets and are similar to equity derivatives in their working, that is, everything is standardized and a person can purchase a contract by paying only a percentage of the contract value. A person can also go short on these exchanges. Moreover, even though there is a provision for delivery, most contracts are squared-off before expiry and are settled in cash. As a result, one can see an active participation by people who are not associated with the commodity. The typical **structure of commodity futures markets in India** is as follows:

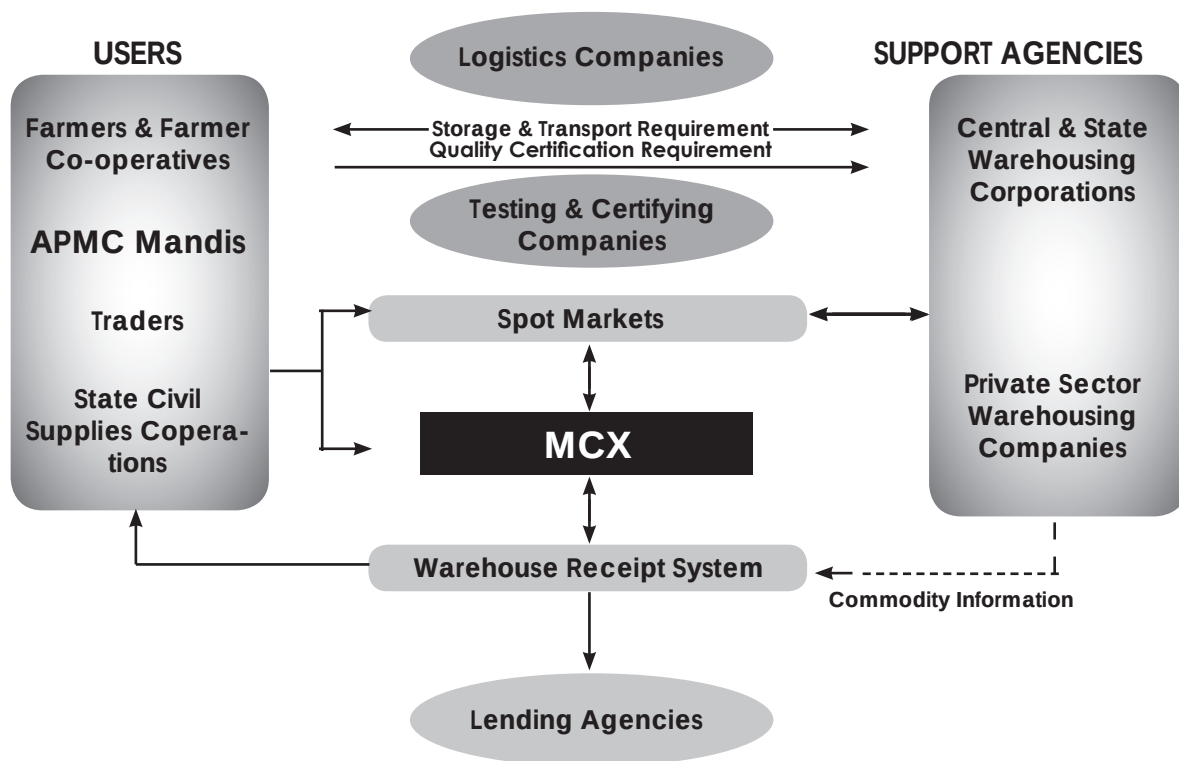


At present, there are 26 exchanges operating in India and carrying out futures trading activities in as many as 146 commodity items. As per the recommendation of the FMC, the Government of India recognized the National Multi Commodity Exchange (NMCE), Ahmadabad; Multi Commodity Exchange (MCX), National Commodity and Derivative Exchange (NCDEX), Mumbai and Indian Commodity Exchange (ICEX) as nation-wide multi-commodity exchanges.

As compared to 59 commodities in January 2005, 94 commodities were traded in December 2006 in the commodity futures market. These commodities included major agricultural commodities such as rice, wheat, jute, cotton, coffee, major pulses (such as urad, arahar and chana), edible oilseeds (such as mustard seed, coconut oil, groundnut oil and sunflower), spices (pepper, chillies, cumin seed and turmeric), metals (aluminium, tin, nickel and copper), bullion (gold and silver), crude oil, natural gas and polymers, among others. Gold accounted for the largest share of trade in terms of value. A temporary ban was imposed on futures trading in urad and tur dal in January 2007 to ensure orderly market conditions. An efficient and well-organised commodities futures market is generally acknowledged to be helpful in price discovery for traded commodities.



3.3.1 Commodity Eco-System



3.3.2 Commodities Traded In India

World-over one will find that a market exists for almost all the commodities known to us. These commodities can be broadly classified into the following:

Metal	Aluminium, Copper, Lead, Nickel, Sponge Iron, Steel Long (Bhavnagar), Steel Long (Govindgarh), Steel Flat, Tin, Zinc
Bullion	Gold, Gold HNI, Gold M, i-gold, Silver, Silver HNI, Silver M
Fiber	Cotton L Staple, Cotton M Staple, Cotton S Staple, Cotton Yarn, Kapas
Energy	Brent Crude Oil, Crude Oil, Furnace Oil, Natural Gas, M. E. Sour Crude Oil
Spices	Cardamom, Jeera, Pepper, Red Chilli, Turmeric
Plantations	Arecanut, Cashew Kernel, Coffee (Robusta), Rubber
Pulses	Chana, Masur, Yellow Peas
Petrochemicals	HDPE, Polypropylene(PP), PVC
Oil & Oil Seeds	Castor Oil, Castor Seeds, Coconut Cake, Coconut Oil, Cotton Seed, Crude Palm Oil, Groundnut Oil, Kapasia Khalli, Mustard Oil, Mustard Seed (Jaipur), Mustard Seed (Sirsa), RBD Palmolein, Refined Soy Oil, Refined Sunflower Oil, Rice Bran DOC, Rice Bran Refined Oil, Sesame Seed, Soymeal, Soy Bean, Soy Seeds
Cereals	Maize
Others	Guargum, Guar Seed, Gurchaku, Mentha Oil, Potato (Agra), Potato (Tarkeshwar), Sugar M-30, Sugar S-30

3.3.3 Commodities in Which Futures Trading Is Being Conducted In India



3.3.4 Year Wise Turnover Wise Comparative Analysis

Exchanges	2004 – 05	2005 – 06	2006 – 07	2007 – 08
MCX	165,147	961,633	1,621,803	2,505,206
NCDEX	266,338	1,066,686	944,066	733,479
NMCE	13,988	18,385	101,731	24,072
NBOT	58,463	53,683	57,149	74,582
Others	67,823	54,735	14,591	37,997
All Exchanges	571,759	2,155,122	2,739,340	3,375,336

Total value of trading at the Commodity Exchanges during the fortnight from 1st March 2010 to 15th March 2010 was ₹ 3, 78,758.22 crores. The cumulative value of trades from 1st April, 2009 upto 15th March, 2010 for the financial year 2009-10 was ₹ 73,50,974.95 crores. The corresponding figures for the previous year were ₹ 2, 62,813.49 crores and ₹ 49, 07,310.41 crores respectively.



3.3.5 India's place in World Market

Commodity	India	World	Share	Rank
Rice (Paddy)	240	2049	11.71	Third
Wheat	74	599	12.35	Second
Pulses	13	55	23.64	First
Groundnut	6	35	17.14	Second
Rapeseed	6	40	15.00	Third
Sugarcane	315	1278	24.65	Second
Tea	0.75	2.99	25.08	First
Coffee (Green)	0.28	7.28	3.85	Eight
Jute and Jute Fibers	1.74	4.02	43.30	Second
Cotton (Lint)	2.06	18.84	10.09	Third

3.3.6 Indian Exchanges for Commodity Market

The following are the list of exchange and commodities in which futures contracts are traded in India are as follows

S.NO	EXCHANGE	COMMODITY
1	India pepper & Spice Trade Association , Kochi(IPSTA)	Pepper (both domestic and international contracts)
2	Vijay Beopar chamber Ltd., Muzaffarnagar	Gur
3	Rajdhani oil & oilseed exchange Ltd, Delhi	Gur, Mustard seed its oil & oilcake
4	Bhatinda Om & oil exchange Ltd ,Bhantada	Gur
5	The chamber of commerce ,Hapur	Gur , potatoes and Mustard seed
6	The Meerut Agro Commodity Exchange Ltd., Meerut	Gur
7	The Bombay Commodity Exchange Ltd., Bombay	Oilseed complex
8	Rajkot seeds, oil & Bullion Merchants Association , Rajkot	Castrol seed, Ground nut, its oil & cake, cottonseed its oil & cake, cotton & RBD Palmolein
9	The Ahmedabad Commodity Exchange, Ahmedabad	Castrol seed, cottonseed , its oil and oilcake
10	The East India Jute & Hussian Exchange Ltd., Calcutta	Hessian & sacking
11	The East India cotton Association Ltd., Calcutta	Cotton
12	The Spices & Oilseeds Exchange Ltd, Sangli	Turmeric
13	Kanpur Commodity Exchange Ltd., Kanpur	Rapeseed/Mustard seed, its oil and cake
14	National Board of trade, Indore	Soya seed, Soya oil and Soya meals. Rapeseed/Mustard seed its oil and oilcake and RBD Palmolien
15	The First Commodities Exchange of India Ltd., Kochi	Copra/Coconut, its oil& oilcake
16	Central India Commerce Exchange Ltd., Gwalior	Gur and Mustard Seed
17	E-Sugar India Ltd., Mumbai	Sugar
18	National Multi –Commodity Exchange of India Ltd., Ahmedabad	Oilseed complex and Rubber , sugar, Aluminum, nickel ,Zinc, Copper, Lead. tin ,pepper, Gram and Sacking

19	Coffee Futures Exchange India Ltd.,Bangalore	Coffee
20	Surendranagar Cotton oil & Oilseeds, Surendranagar	Cotton,.Cotton seed, Kapas
21	E-Commodities Ltd.,New Delhi	Sugar
22	Bullion Merchants Association , Bikaner	Mustard seed its oil & oilcake
23	Multi Commodity Exchange (MCX), Mumbai	Metals & Agri Commodities
24	National Commodity and Derivation Exchange (NCDEX), Mumbai	Metals & Agri Commodities
25	National Multi Commodity Exchange (NMCE)	Metals & Agri Commodities
26	Indian Commodity Exchange (ICEX)	Metals & Agri Commodities

3.4 INDIAN COMMODITY MARKET - REGULATORY FRAMEWORK

3.4.1 Need for Regulation

The need for regulation arises on account of the fact that the benefits of futures markets accrue in competitive conditions. Proper regulation is needed to create competitive conditions. In the absence of regulation, unscrupulous participants could use these leveraged contracts for manipulating prices. This could have undesirable influence on the spot prices, thereby affecting interests of society at large.

Regulation is also needed to ensure that the market has appropriate risk management system. In the absence of such a system, a major default could create a chain reaction. The resultant financial crisis in a futures market could create systematic risk. Regulation is also needed to ensure fairness and transparency in trading, clearing, settlement and management of the exchange so as to protect and promote the interest of various stakeholders, particularly non-member users of the market.

After independence, the Constitution of India brought the subject of "Stock Exchanges and futures markets" in the Union list. As a result, the responsibility for regulation of commodity futures markets devolved on Govt. of India. A Bill on forward contracts was referred to an expert committee headed by Prof. A.D.Shroff and Select Committees of two successive Parliaments and finally in December 1952 Forward Contracts (Regulation) Act, 1952, was enacted. The Act provided for 3-tier regulatory system;

- An association recognized by the Government of India on the recommendation of Forward Markets Commission,
- The Forward Markets Commission (it was set up in September 1953) and
- The Central Government.

Forward Contracts (Regulation) Rules were notified by the Central Government in July,1954.

The Act divides the commodities into 3 categories with reference to extent of regulation, viz.:

- The commodities in which futures trading can be organized under the auspices of recognized association.
- The Commodities in which futures trading is prohibited.
- Those commodities which have neither been regulated for being traded under the recognized association nor prohibited are referred as Free Commodities and the association organized in such free commodities is required to obtain the Certificate of Registration from the Forward Markets Commission.



3.4.2 Forward Markets Commission (FMC)

Forward Markets Commission (FMC) headquartered at Mumbai, is a regulatory authority which is overseen by the Ministry of Consumer Affairs, Food and Public Distribution, Govt. of India. It is a statutory body set up in 1953 under the Forward Contracts (Regulation) Act, 1952.

Forward Markets Commission provides regulatory oversight in order to ensure financial integrity (i.e. to prevent systematic risk of default by one major operator or group of operators), market integrity (i.e. to ensure that futures prices are truly aligned with the prospective demand and supply conditions) and to protect and promote interest of customers/ non-members. It prescribes the following regulatory measures:

1. Limit on net open position as on the close of the trading hours. Some times limit is also imposed on intra-day net open position. The limit is imposed operator-wise, and in some cases, also member-wise.
2. Circuit-filters or limit on price fluctuations to allow cooling of market in the event of abrupt upswing or downswing in prices.
3. Special margin deposit to be collected on outstanding purchases or sales when price moves up or down sharply above or below the previous day closing price. By making further purchases/sales relatively costly, the price rise or fall is sobered down. This measure is imposed only on the request of the exchange.
4. Circuit breakers or minimum/maximum prices: These are prescribed to prevent futures prices from falling below as rising above not warranted by prospective supply and demand factors. This measure is also imposed on the request of the exchanges.
5. Skipping trading in certain derivatives of the contract, closing the market for a specified period and even closing out the contract: These extreme measures are taken only in emergency situations.

Besides these regulatory measures, the F.C(R) Act provides that a client's position cannot be appropriated by the member of the exchange, except when a written consent is taken within three days time. The FMC is persuading increasing number of exchanges to switch over to electronic trading, clearing and settlement, which is more customer-friendly. The FMC has also prescribed simultaneous reporting system for the exchanges following open out-cry system. These steps facilitate audit trail and make it difficult for the members to indulge in malpractices like trading ahead of clients, etc. The FMC has also mandated all the exchanges following open outcry system to display at a prominent place in exchange premises, the name, address, telephone number of the officer of the commission who can be contacted for any grievance. The website of the commission also has a provision for the customers to make complaint and send comments and suggestions to the FMC. Officers of the FMC have been instructed to meet the members and clients on a random basis, whenever they visit exchanges, to ascertain the situation on the ground, instead of merely attending meetings of the board of directors and holding discussions with the office-bearers.

3.4.3 Forward Market Commission of India

The Forward Markets Commission is a regulatory body for commodity markets in India. The forward contracts in commodities are regulated as per F.C.(R) Act, 1952 by this body. Inherent objective is to achieve price stability by means of price discovery and risk management. The Commission also collects information regarding the trading conditions in respect of goods to which any of provisions of Act is made applicable. It also advises Central Government regarding recognition of associations.

3.4.4 Functions of Forward market commission of India

- (a) To advice the Central Government in respect of the recognition or withdrawal of recognition from any association. It also advises government about any other matter arising out of the administration of this act.

- (b) Second function of the act includes the task of keeping forward market s under observation and take necessary actions. The actions taken should be according to powers given to the commission by the "Forward Contract Regulation Act".
- (c) To collect information regarding the trading conditions in respect of goods (to which any of the provisions of this Act is made applicable) including information regarding supply, demand and prices. And publish information whenever the Commission thinks it necessary, It also performs the task of submitting to the Central Government periodical reports on the operation of this Act and on the working of forward markets relating to such goods.
- (d) To make recommendations generally with a view to improving the organization and working of forward markets
- (e) To undertake the inspection of the accounts and other documents of [any recognized association or registered association or any member of such association] whenever it considers it necessary.
- (f) To perform such specified duties and exercise assigned powers by the "Forward Contract Regulation Act".

3.4.5 Powers of Forward market commission

- (1) The Commission shall, in the performance of its functions, have all the powers of a civil court under the Code of Civil Procedure, 1908 (5 of 1908), while trying a suit in respect of the following matters, namely:
 - (a) Summoning and enforcing the attendance of any person and examining him on oath. 8
 - (b) Requiring the discovery and production of any document.
 - (c) Receiving evidence on affidavits.
 - (d) Requisitioning any public record or copy thereof from any office.
 - (e) Any other matters which may be prescribed.
- (2) The Commission shall have the power to require any person, subject to any privilege which may be claimed by that person under any law for the time being in force, to furnish information on such points or matters as in the opinion of the Commission may be useful for, or relevant to any matter under the consideration of the Commission and any person so required shall be deemed to be legally bound to furnish such information within the meaning of Sec. 176 of the Indian Penal code, 1860 (45 of 1860).
- (3) The Commission shall be deemed to be a civil court and when any offence described in Sections. 175, 178, 179, 180 or Sec. 228 of the Indian Penal Code, 1860 (45 of 1860), is committed in the view or presence of the Commission, the Commission may, after recording the facts constituting the offence and the statement of the accused as provided for in the Code of Criminal Procedure, 1898 (5 of 1898) 11 [11] forward the case to a Magistrate having jurisdiction to try the same and the Magistrate to whom any such case is forwarded shall proceed to hear the complaint against the accused as if the case had been forwarded to him under Section 482 of the said Code 12 [12].
- (4) Any proceeding before the Commission shall be deemed to be a judicial proceeding within the meaning of Sections. 193 and 228 of the Indian Penal Code, 1860

3.4.6 Regulatory measures taken by FMC

(1) Illegal contracts

Following are the scenarios, in which the contracts are termed as illegal contracts,

- (a) Forward Contracts in the permitted commodities, i.e., commodities notified under S.15 of the



Forward Contracts (Regulation) Act, 1952, which are entered into other than: (a) between the members of the recognized Association or (b) through or (c) with any such members.

- (b) Forward contracts in prohibited commodities, which are described under section 17 of forward contract act.
- (c) Forward Contracts in the commodities in which such contracts have been prohibited.

(2) Measures against Illegal Forward Trading

- (a) The role of Forward Markets Commission is to communicate the information relating to offences under the Act to the police authorities and assist such authorities in their work such as accompanying the police in conducting searches for documents etc.
- (b) The offences under the Act are technical in nature and it is difficult to prove the charges in accordance with the rules of evidence contained in the Evidence Act. So, the Forward Markets Commission periodically conducts training programs, Seminars, Workshops etc. for the benefit of Police Officers/ Prosecutors and also Judicial Magistrates First Class/Metropolitan Magistrates.

(3) Rules governing illegal Forward Contracts

- (a) Owner of a place which is used for performing illegal forward contracts, with the knowledge of such owner.
- (b) A person who, without permission of the Central Government, organizes illegal forward contract.
- (c) Any person who willfully misrepresents or induces any person to believe that he is a member of a recognized association or that forward contract can be performed through him.
- (d) Any person who is not a member of a recognized association canvasses, advertises or touts in any business connected with forward contracts in contravention of the Forward Contracts (Regulation) Act, 1952.
- (e) Any person who joins, gathers, or assists in gathering at any place other than the place of business specified in the bye-laws of the recognized associations for making bids or offers or for entering into illegal forward contracts.
- (f) Any person who makes publishes or circulates any statement or information, which is false and which he knows to be false, affecting or tending to affect the course of business in forward contracts in permitted commodities.

3.4.7 Important development and regulatory steps taken by FMC

The Forward Markets Commission is committed towards the development of institutional capability of the commodity market. The Commission has taken several steps in this direction, which include sensitizing policy makers and all other co traders improving the efficiency of all the participants in the marketing chain by organizing awareness programs, workshops, subject specific consultancies, study tours, lectures, etc., members FMC has set itself an ambitious target for reaching out to various market segments and grass roots level participants. FMC solicits active collaboration with Universities, Educational Institutions and other organizations desiring to spread awareness about Futures Trading in commodities.

The developmental measures also include the price dissemination among the farmers through APMCs (spot market regulators).

3.4.8 The commodities that is suitable for Forward Contract

All the commodities are not suitable for futures trading and for conducting futures trading. For being suitable for futures trading the market for commodity should be competitive, i.e., there should be large demand for and supply of the commodity - no individual or group of persons acting in concert should be in a position to influence the demand or supply, and consequently the price substantially. There should be fluctuations in price. The market for the commodity should be free

from substantial government control. The commodity should have long shelf-life and be capable of standardisation and gradation.

With the issue of the Notifications dated 1.4.2003 futures trading is not prohibited in any commodity. Futures trading can be conducted in any commodity subject to the approval /recognition of the Government of India. 91 commodities are in the regulated list i.e. these commodities have been notified under section 15 of the Forward Contracts (Regulation) Act. Forward trading in these commodities can be conducted only between, with, or through members of recognized associations. The commodities other than those listed under Section 15 are conventionally referred to as 'Free' commodities. Forward trading in these commodities can be organized by any association after obtaining a certificate of Registration from Forward Markets Commission.

3.4.9 Limitations and Future of FMC

This section presents limitations, various issues and challenges present in FMC and what the future of FMC is going to be.

(1) Limitations of FMC

Following are the limitations of FMCs

- (a) Option trading prohibited
- (b) Functions as a Government department with limited autonomy with respect to:
 - (i) Recognition / de-recognition of exchanges
 - (ii) Regulation of intermediaries
 - (iii) Financial and administrative autonomy.
- (c) Market expansion has put heavy pressure on the FMC's coping capacity

(2) Issues and Challenges

(a) Strengthening of and Autonomy for the Regulator

Currently, the commission is an arm functioning under the Ministry of Consumer Affairs and it looks after the working of futures exchanges also. Unlike India's autonomous stock market regulator, the commodities regulator i.e. Forward Market Commission (FMC), is controlled by the Consumer Affairs Ministry and needs to seek government permission for many decisions. As per the latest news, the Forward Market Commission will be given autonomy through an ordinance to strengthen the legal and regulatory framework with stiffer punishment for violators and stringent provisions for preventing misuse of insider information. According to FMC chairman B C Khatua, strengthening the regulator would likely enable banks and financial institutions to enter commodities bourses and deepen trading. The changes would also help the introduction of options trading in commodities. The strength of the FMC would be raised from the present four members to nine, including a Chairman and upto three whole-time members.

(b) Increasing the breadth and depth of the market

For increasing breadth and depth of market, there is necessity of participation of farmers/ aggregators and other hedgers as well as participation of banks and mutual funds.

(c) Improving the Governance of Exchanges and Intermediaries

Possible way to improve this can be stricter enforcement of legal and regulatory provisions and improvement in competencies and transparency.

(d) Standardisation of contract designs and quality parameters across the market

There is a need for standardization of contract designs and quality control parameters are to be fixed across the market to maintain uniformity.



(e) Removal of interstate tariff and non-tariff barriers –Market integration

For market integration, there is a need for revisiting the tariffs – inter-state as well as the non-tariff barriers, which are divergently in existence at different states in India. There is a need for rationalization to facilitate the participants and allow seamless flow of transactions.

(f) Capacity Building: FMC, Exchanges, Warehouses

Imbibing quality improvement in services through building of qualitative infrastructure for increasing the capacity of an organization which would facilitate working together with the stakeholders.

(g) R & D in Commodity market governance and structural issues

Research and Development activities in commodity market shall strengthen the quality of services, improve the degree of transparency. Expansion of markets, innovations are possible through R&D in this economic spectrum.

(h) Sensitizations of policy makers / opinion makers with respect to the benefits of the commodity futures market

Increasing financial literacy, propagating the benefits of commodity futures market amongst the stakeholders/participants is one of the major objective which will facilitate to sensitize the policy makers/ opinion makers.

(3) Way Forward

The followings are under implementation:

- (a) Amendment of Forward Contracts (Regulation) Act, 1952.
- (b) A progressive FDI policy for the Commodity Exchanges.
- (c) Greater and urgent action on governance issues including storage, quality and delivery related issues.
- (d) Dissemination of commodity prices (futures and spot) through ticker boards. (Provision of ₹ 100million in 2007-08.)
- (e) A massive awareness campaign among the stake holders including farmers.
- (f) Programs for capacity building across the value chain. – ₹ 25 mn budgeted
- (g) Efforts are on to promote Aggregators for direct participation of the farmers in the market.
- (h) Hope to see a well regulated, strong, efficient and transparent commodity futures market in India in 2 to 3 years time.

3.5 INDIAN ECONOMY AND ROLE OF AGRICULTURAL COMMODITY

3.5.1 Introduction

It is well-known that commodities are the foundation of the economies of most developing countries by way of providing food, creating income-generating opportunities and export earnings to the people directly involved in agricultural activities. Like others, Indian commodity sector has also been experiencing tremendous surge towards a more sophisticated structure during the last decade. Being a key sector, occupying almost 17% share (at constant price of 2004-05) of India's Gross Domestic Product (GDP) during 2009-10, Agriculture and Allied sectors plays a very important role in the Indian economy. Therefore, unlike of other countries all over the world where the share of that specific sector in their respective GDP is quite marginal (except in some Asian countries like Pakistan, Bangladesh, Sri

Lanka, Indonesia, China, Thailand, Malaysia, etc.), the growth of agriculture and allied sector has a significant role in the overall growth of Indian economy. In most of the agriculture driven economy, it has been commonly observed that the agricultural policy (s) made by the Government tends to protect and promote the agriculture sector through different procurement and administered price mechanism. At the same time, in view of reduced direct support to agriculture under the Agreement on Agriculture with the World Trade Organization (WTO), there is a tremendous policy shift towards the market oriented approach. Historically, the Government intervention is found at every stage of the marketing of major agricultural products. These includes, setting Minimum Support Prices for selected commodities, regulation of every activity of marketing such as transportation, storage, credit supply and international trading of these commodities, etc. But Government intervention has significantly declined after the initiation of liberalization and economic reforms since 1991. The impact of agricultural commodity is of great importance in the stabilization of Indian economy, as reflected through the share of primary articles, especially the food articles in derivation of the price indices (WPI and CPI) in India. The current weight of primary articles in 2004-05 series of WPI in India is 20.11815%, out of which the weight of Food and Nonfood articles are respectively 14.33709% and 4.25756%. On the other hand the weight of Food and Beverages in CPI in India is currently fixed at 47.13%. These facts clearly indicate the necessity of significant growth and stability of agricultural sector to foster the overall growth of Indian economy.

3.5.2 Derivatives and its Role in Commodity Market

Given the standing International Commodity Agreement, a regular attempts are made worldwide to establish the necessity of managing the risk of agricultural market, rather the market itself. It has been clearly observed how the policy of market intervention and stabilization of agricultural commodity market have shifted towards policies that emphasized on the management of the concerned risk through market-based instruments. Prices of agricultural commodities are determined increasingly by market forces of demand and supply. Hence fluctuation in demand and supply of agricultural commodities is expected to result in high price risk for agri-business. Various studies such as *Varangis (2002)*, *Morgan(2000)* have strongly indicated that due to the radical transformation of commodity market policies in most of the Less Developing Countries (LDCs) from its original interventionist roots to market-based approaches would be able to successfully deal with commodity price risk and will bring the necessary market stability.

Application of several market-based instruments to deal with the commodity price risk basically focuses on the introduction of derivatives viz. futures and options contract on several commodities. In other words, it is widely proposed to setup an efficient derivative market for commodities to strengthen the agricultural market. It is internationally appreciated that if the derivative markets function adequately, some of the important policy goals regarding price volatility of agricultural commodities can be addressed in a market oriented manner. The basic need to trade in commodity derivatives in general and commodity futures in particular arises essentially to get the necessary support from any variation in the commodity prices. This is nothing but what we call *Hedging*. Hedging can be represented as just taking a required amount of counter position (Buy or Sell) in a standardized futures contract against the corresponding position (Sell or Buy) of the related underlying commodity. This counter positions in the futures contract help to offset the loss expected to incur from the adverse price movements of the underlying commodities. Therefore it is very important to develop futures and other forms of derivative trading in all commodities those are vulnerable to large and erratic price fluctuations. The growth in the production of principal crops in India over the last two decades, as tabulated in *Table T2*, supports the requirement of such futures contract to facilitate the necessary growth in agricultural sector in India. Commodity futures also help to discover the future prices of underlying commodities. This anticipation of commodity prices as on some future dates makes the underlying market more strong and vibrant. Therefore, commodity futures market is expected to have a built-in mechanism for stabilizing commodity prices which are otherwise prone to fluctuate in response to any swing in the demand and supply forces. But at the same time it is also important to ensure that the commodity



futures market is free from any manipulations, which otherwise lead to price distortion and resist the market from performing an effective price discovery function. *Table T3* summarizes the simultaneous growth of the whole Economy and also of the Agricultural sector with the growth in commodity futures trading in different countries or regions all over the world over the last decade. Even if it was generally felt that the initiation of derivatives trading on commodities will successfully achieve its primary goal of managing the price volatility observed in the commodity market, especially after the withdrawal of regulators' intervention on agricultural commodities, the role actually played by such market-based instruments in different LDCs has come under a severe doubts among the market players.

3.5.3 Evidences of Price Discovery and Spot Price Volatility in the Indian Commodities Market

India has passed through a tumultuous period and researchers have tried to examine the various aspects related to future market efficiency. The findings of empirical studies undertaken on different India has passed through a tumultuous period and researchers have tried to examine the various commodities after the commencement of organized futures trading are presented in the section below.

3.5.4 Agricultural Commodities

Wheat

Wheat is the second largest cereal grain consumed on earth and the consumption is expected to increase from 680 million tons in 2009-10 to 775 million tons in 2020. Within the country government intervenes in the normal market functioning to stabilize the prices and supply. Wheat futures were studied from 2004 to 2006 (Raizada & Sahi, 2006) for examining the price discovery and results indicated that they are even in weak form inefficient and did not aid in price discovery. Rather, information assimilation was faster in spot market. It was also observed that growth in wheat futures volume had a significant impact on volatility. Sahi G.S. in another study again confirmed the significant impact on spot price volatility of increase in wheat futures trading volume & open interest. Ghosh (2010) using the wheat data from 2009-10 also found that futures prices did not serve as reference price for transacting contracts in physical market. The volume of futures trading was too low to influence the spot market prices. However, in the period of 2004-07 Mukherjee (2010) used Vector Auto regression technique on spot & futures prices and found evidence of futures market leading spot market. The result of GARCH (1,1) showed no volatility interdependence in the two wheat markets. The Findings of the study by Lokare S.M.(2007) for the period 2003-04 gave evidence of higher volatility of wheat futures prices compared to spot prices. Therefore, studies on wheat have given mixed results as to the effectiveness of futures trading which may be because wheat being an essential food item has been facing government intervention to maintain price and supply stability.

Pepper

Indian pepper is traded at a premium in international markets owing to its superior quality. In case of pepper, futures market was found to be leading the spot market with bidirectional volatility spillover in both markets (Mukherjee, 2010). Even Lokare S.M.(2007) examined that pepper futures market was efficient. But in the research by Gurbandini, 2010 pepper future contracts were not fairly priced giving rise to arbitrage opportunities. In a very recent study by Dey K., 2011 on pepper spot & future prices from 2006 to 2010, it was observed that there was unidirectional causality from futures to spot market. Also, positive shocks generated steeper movement on logarithmic conditional variance of spot and future return series as compared to negative shocks.

Chana

India is the largest producer of chana(chickpea) followed by Pakistan. A Chana future trading was examined by Abhijit Sen Committee, 2008 to review the spot price increase in 2006-07. The committee observed that no major change in spot price volatility was observed after introduction of futures

trading. Low production in 2005-06 could have driven up the prices. In a study on price discovery, futures prices led spot prices of chana and there was no evidence of volatility spillover in the two markets (Mukherjee, 2010). Research by Gurbandini, 2010 showed that closing spot prices of chana for the previous day had no impact on the opening future price of the subsequent day. Also, futures contracts were overpriced on 85% of the trading days observed.

Castor Seed

India is the biggest exporter of castor oil holding about 70% share of the International trade. Castor oil is the largest vegetable oil exported out of India. Castor seed market of Mumbai and Ahmadabad from 1986 to 1999 was studied by Karande (2007) giving evidence of futures market performing the price discovery function for all contracts except those where the trading volume was too less. Spot price volatility did increase after the introduction of futures trading but it stabilized later indicating that introduction of futures aided in information assimilation and had a beneficial impact on spot market volatility. However Mukherjee (2010) found no lead lag relation and volatility interdependence in spot & future prices.

Soya Oil

Refined soya oil is one of the main consuming edible oil in India and is the leading vegetable oil traded in the international market. Soya Oil futures led the spot market but there was no volatility spillover from futures to spot market (Mukherjee, 2010). Refined Soya Oil contracts were underpriced for 74% of the observed trading days (Gurbandini, 2010)

Chilli

India is the largest producer & exporter of chilli with domestic demand from the spice producing industry increasing at a fast rate. Also, globally Indian chillies are of superior quality. Though futures market was found perform the function of price discovery but volatility spillover was also observed from futures to spot market (Mukherjee, 2010)

Jeera

Jeera (Cumin Seed) contract is highly liquid and so is useful for hedgers & speculators as well. In case of Jeera spot markets were leading the futures market. Also there was volatility spillover from futures to spot market (Mukherjee, 2010)

Mentha Oil

Demand of Mentha Oil comes from the food and cosmetic industry and India plays a significant role in the world mentha oil market being the largest producer and exporter of the commodity. In mentha oil market, futures market was leading the spot market with bi directional volatility spillover in both markets (Mukherjee, 2010)

Mustard Seed

Being an important source of edible oil and feed meal to the country, mustard seed (RM seed) is the focus of Indian Oilseed Industry. There is considerable price volatility in the physical and futures RM Seed market. Exchange traded RM seed futures are ideal for the price risk management needs of producers, traders, processors and end users. Spot prices of mustardsdeed were leading the future prices with no volatility interdependence (Mukherjee, 2010)

Cotton

India is one of the largest producer & consumers of cotton and in 2010-11 it was the world's second largest exporter. Cotton futures were examined from 2003 to 2004 by Lokare(2007). Futures prices



exhibited higher volatility than spot prices with indications of speculation in many contracts. However, long run co integration was established in both markets.

Rubber

World Natural Rubber (NR) production has increased by 43% in the last decade whereas the consumption has gone up by 47%. Rubber futures prices variability was higher than that of spot prices reflecting excessive speculation Lokare (2007). Iyer V., Pillai A (2010) empirically testing the rubber futures contract examined that rubber futures contract were not useful for hedging as the information convergence we expiration week.

3.6 UNRESOLVED ISSUES AND FUTURE PROSPECTS

3.6.1 Unresolved Issues

Even though the commodity derivatives market has made good progress in the last few years, the real issues facing the future of the market have not been resolved. Agreed, the number of commodities allowed for derivative trading have increased, the volume and the value of business has zoomed, but the objectives of setting up commodity derivative exchanges may not be achieved and the growth rates witnessed may not be sustainable unless these real issues are sorted out as soon as possible. Some of the main unresolved issues are discussed below.

- (a) **Commodity Options:** Trading in commodity options contracts has been banned since 1952. The market for commodity derivatives cannot be called complete without the presence of this important derivative. Both futures and options are necessary for the healthy growth of the market. While futures contracts help a participant (say a farmer) to hedge against downside price movements, it does not allow him to reap the benefits of an increase in prices. No doubt there is an immediate need to bring about the necessary legal and regulatory changes to introduce commodity options trading in the country. The matter is said to be under the active consideration of the government and the options trading may be introduced in the near future.
- (b) **The Warehousing and Standardization:** For commodity derivatives market to work efficiently, it is necessary to have a sophisticated, cost-effective, reliable convenient warehousing system in the country. The Habibullah (2003) task force admitted, "A sophisticated warehousing industry has yet to come about". Further, independent labs or quality testing centers should be set up in each region to certify the quality, grade and quantity of commodities so that they are appropriately standardized and there are no shocks waiting for the ultimate buyer who takes the physical delivery. Warehouses also need to be conveniently located. Central Warehousing Corporation of India (CWC: www.fieo.com) is operating 500 Warehouses across the country with a storage capacity of 10.4 million tonnes. This is obviously not adequate for a vast country. To resolve the problem, a Gramin Bhandaran Yojana (Rural Warehousing Plan) has been introduced to construct new and expand the existing rural godowns. Large scale privatization of state warehouses is also being examined.
- (c) **Cash versus Physical Settlement:** It is probably due to the inefficiencies in the present warehousing system that only about 1% to 5% of the total commodity derivatives trade in the country are settled in physical delivery. Therefore the warehousing problem obviously has to be handled on a war footing, as a good delivery system is the backbone of any commodity trade. A particularly difficult problem in cash settlement of commodity derivative contracts is that at present, under the Forward Contracts (Regulation) Act 1952, cash settlement of outstanding contracts at maturity is not allowed. In other words, all outstanding contracts at maturity should be settled in physical delivery. To avoid this, participants square off their positions before maturity. So, in practice, most contracts are settled in cash but before maturity. There is a need to modify the law to bring it closer to the widespread practice and save the participants from unnecessary hassles.

- (d) **The Regulator:** As the market activity pick-up and the volumes rise, the market will definitely need a strong and independent regulator, similar to the Securities and Exchange Board of India (SEBI) that regulates the securities markets. Unlike SEBI which is an independent body, the Forwards Markets Commission (FMC) is under the Department of Consumer Affairs (Ministry of Consumer Affairs, Food and Public Distribution) and depends on it for funds. It is imperative that the Government should grant more powers to the FMC to ensure an orderly development of the commodity markets. The SEBI and FMC also need to work closely with each other due to the inter-relationship between the two markets.
- (e) **Lack of Economy of Scale:** There are too many (3 national level and 21 regional) commodity exchanges. Though over 80 commodities are allowed for derivatives trading, in practice derivatives are popular for only a few commodities. Again, most of the trade takes place only on a few exchanges. All this splits volumes and makes some exchanges unviable. This problem can possibly be addressed by consolidating some exchanges. Also, the question of convergence of securities and commodities derivatives markets has been debated for a long time now. The Government of India has announced its intention to integrate the two markets. It is felt that convergence of these derivative markets would bring in economies of scale and scope without having to duplicate the efforts, thereby giving a boost to the growth of commodity derivatives market. It would also help in resolving some of the issues concerning regulation of the derivative markets. However, this would necessitate complete coordination among various regulating authorities such as Reserve Bank of India, Forward Markets commission, the Securities and Exchange Board of India, and the Department of Company affairs etc.
- (f) **Tax and Legal bottlenecks:** There are at present restrictions on the movement of certain goods from one state to another. These need to be removed so that a truly national market could develop for commodities and derivatives. Also, regulatory changes are required to bring about uniformity in octroi and sales taxes etc. VAT has been introduced in the country in 2005, but has not yet been uniformly implemented by all states.

India is one of the top producers of a large number of commodities, and also has a long history of trading in commodities and related derivatives. The commodities derivatives market has seen ups and downs, but seem to have finally arrived now. There is a great need and vast scope of commodity derivative market in India provided the mistakes of the past are not repeated and the Government promptly addresses the serious problems facing the market. Among issues that need immediate resolution are those related to introduction commodity options, warehousing, cash settlement at maturity and standardization.

3.6.2 Future Prospects

With the gradual withdrawal of the Govt. from various sectors in the post liberalization era, the need has been left that various operators in the commodities market be provided with a mechanism to hedge and transfer their risk. India's obligation under WTO to open agriculture sector to world trade require future trade in a wide variety of primary commodities and their product to enable divers market functionaries to cope with the price volatility prevailing in the world markets.

Following are some of applications, which can utilize the power of the commodity market and create a win-win situation for all the involved parties:-

- Regulatory approval/permission to FII'S to trading in the commodity market.
- Active Involvement of mutual fund industry of India.
- Permission to Banks for acting as Aggregators and traders.
- Active involvement of small Regional stock exchanges.
- Newer Avenues for trading in Foreign Derivatives Exchanges.



- Convergence of variance market.
- Amendment of the commodities Act and Implementers of VAT.
- Introduction of option contract.

3.7 INSTRUMENTS AVAILABLE FOR TRADING

In recent years, derivatives have become increasingly popular due to their applications for hedging, speculation and arbitrage.

While futures and options are now actively traded on many exchanges, forward contracts are popular on the OTC market.

While at the moment only commodity futures trade on the NCDEX, eventually, as the market grows, we also have commodity options being traded.

3.7.1 Forward Contracts

A forward contract is an agreement to buy or sell an asset on a specified date for a specified price.

One of the parties to the contract assumes a long position and agrees to buy the underlying asset on a certain specified future date for a certain specified price. The other party assumes a short position and agrees to sell the asset on the same date for the same price. Other contract details like delivery date, price and quantity are negotiated bilaterally by the parties to the contract. The forward contracts are normally traded outside the exchanges.

The salient features of forward contracts are:

- They are bilateral contracts and hence exposed to counter-party risk.
- Each contract is custom designed, and hence is unique in terms of contract size, expiration date and the asset type and quality.
- The contract price is generally not available in public domain.
- On the expiration date, the contract has to be settled by delivery of the asset.
- If the party wishes to reverse the contract, it has to compulsorily go to the same counterparty, which often results in high prices being charged.

However forward contracts in certain markets have become much standardized, as in the case of foreign exchange, thereby reducing transaction costs and increasing transactions volume. This process of standardization reaches its limit in the organized futures market.

3.7.2 Futures Market

Futures markets were designed to solve the problems that exist in forward markets. A futures contract is an agreement between two parties to buy or sell an asset at a certain time in the future at a certain price. But unlike forward contracts, the futures contracts are standardized and exchange traded. To facilitate liquidity in the futures contracts, the exchange species certain standard features of the contract. It is a standardized contract with standard underlying instrument, a standard quantity and quality of the underlying instrument that can be delivered, (or which can be used for reference purposes in settlement) and a standard timing of such settlement. A futures contract may be offset prior to maturity by entering into an equal and opposite transaction. More than 99% of futures transactions are offset this way.

The standardized items in a futures contract are:

- Quantity of the underlying
- Quality of the underlying
- The date and the month of delivery
- The units of price quotation and minimum price change
- Location of settlement

Spot price: The price at which an asset trades in the spot market.

Futures price: The price at which the futures contract trades in the futures market.

Margin Requirements

(i) Initial Margin

The amount that must be deposited in the margin account at the time a futures contract is first entered into is known as initial margin.

Initial margin based on "Value at Risk" Model (VaR) to estimate worst loss that can happen for a time horizon 99% confidence level SPAN® is the system used for margin calculation. Volatility is one of the inputs to the SPAN calculations EWMA/ J.P. Morgan Risk Metrics methodology for calculation of volatility will be adopted. Similar procedure is followed in most international exchanges like CBOT, CME, NYMEX, NYBOT, TOCOM, LME, LIFFE.

(ii) Marking- to- market Margin

In the futures market, at the end of each trading day, the margin account is adjusted to reflect the investor's gain or loss depending upon the futures closing price. This is called marking-to-market.

All open positions will be marked-to-market at the daily settlement price at the end of the day Client has to bring mark-to-market (MTM) margin to be through funds transfer the next day.

(iii) Maintenance margin

This is somewhat lower than the initial margin. This is set to ensure that the balance in the margin account never becomes negative. If the balance in the margin account falls below the maintenance margin, the investor receives a margin call and is expected to top up the margin account to the initial margin level before trading commences on the next day.

3.7.3 Options

Options are fundamentally different from forward and futures contracts. An option gives the holder of the option the right to do something. The holder does not have to exercise this right. In contrast, in a forward or futures contract, the two parties have committed themselves to doing something.

Whereas it costs nothing (except margin requirements) to enter into a futures contract, the purchase of an option requires an up-front payment.

There are two basic types of options, call options and put options.

Call option: A call option gives the holder the right but not the obligation to buy an asset by a certain date for a certain price.

Put option: A put option gives the holder the right but not the obligation to sell an asset by a certain date for a certain price.



3.7.4 Comparative Analysis of Commodity And Equity Markets

Factors	Commodity Markets	Equity Markets
Percentage Returns	Gold gives 10-15 %returns on the conservative Basis	Returns in the range of 15-20 % on annual basis.
Initial Margins	Lower in the range of 4-5-6%	Higher in the range of 25-40%
Arbitrage Opportunities	Exists on 1-2 month contracts. There is a small difference in prices, but in case of commodities, which it is in large tonnage makes a huge difference.	Significant Arbitrage Opportunities exists.
Price Movements	Price movements are purely based on the supply and demand.	Prices movements based on the expectation of future performance.
Price Changes	Price changes are due to policy changes, changes in tariff and duties.	Price changes can also be due to Corporate actions, Dividend announcements, Bonus shares / Stock splits.
Future Predictability	Predictability of future prices is not in the control due to factors like Failure of Monsoon and Formation of El-ninos at Pacific.	Predictability of futures performance is reasonably high, which is supplemented by the History of management performance.
Volatility	Lower Volatility	Higher Volatility
Securities Transaction Act Application	Securities Transaction Act is not applicable to commodity futures trading.	Securities Transaction Act is applicable to equity markets trading.

3.8. PARTICIPANTS OF COMMODITY MARKET

Participants who trade in the derivatives market can be classified under the following three broad categories:

- Hedgers
- Speculators
- Arbitragers

(1) Hedgers

A Hedger can be Farmers, manufacturers, importers and exporter. A hedger buys or sells in the futures market to secure the future price of a commodity intended to be sold at a later date in the cash market. This helps protect against price risks.

The holders of the long position in futures contracts (buyers of the commodity), are trying to secure as low a price as possible. The short holders of the contract (sellers of the commodity) will want to secure as high a price as possible. The commodity contract, however, provides a definite price certainty for both parties, which reduces the risks associated with price volatility. By means of futures contracts, Hedging can also be used as a means to lock in an acceptable price margin between the cost of the raw material and the retail cost of the final product sold.

Someone going long in a securities future contract now can hedge against rising equity prices in three months. If at the time of the contract's expiration the equity price has risen, the investor's contract can

be closed out at the higher price. The opposite could happen as well: a hedger could go short in a contract today to hedge against declining stock prices in the future.

(2) Speculators

Other commodity market participants, however, do not aim to minimize risk but rather to benefit from the inherently risky nature of the commodity market. These are the speculators, and they aim to profit from the very price change that hedgers are protecting themselves against. A hedger would want to minimize their risk no matter what they're investing in, while speculators want to increase their risk and therefore maximize their profits. In the commodity market, a speculator buying a contract low in order to sell high in the future would most likely be buying that contract from a hedger selling a contract low in anticipation of declining prices in the future.

Unlike the hedger, the speculator does not actually seek to own the commodity in question. Rather, he or she will enter the market seeking profits by off-setting rising and declining prices through the buying and selling of contracts.

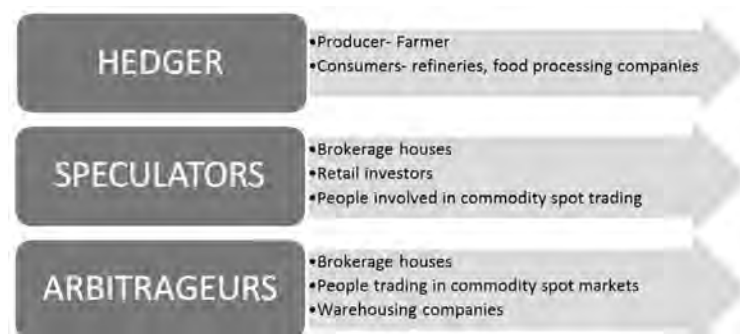
	Long	Short
Hedger	Secure a price now to protect against future rising prices	Secure a price now to protect against future declining prices
Speculator	Secure a price now in anticipation of rising prices	Secure a price now in anticipation of declining prices

(3) Arbitragers

A central idea in modern economics is the law of one price. This states that in a competitive market, if two assets are equivalent from the point of view of risk and return, they should sell at the same price. If the price of the same asset is different in two markets, there will be operators who will buy in the market where the asset sells cheap and sell in the market where it is costly. This activity termed as arbitrage, involves the simultaneous purchase and sale of the same or essentially similar security in two different markets for advantageously different prices. The buying cheap and selling expensive continues till prices in the two markets reach equilibrium. Hence, arbitrage helps to equalize prices and restore market efficiency.

Since the cash and futures price tend to move in the same direction as they both react to the same supply/demand factors, the difference between the underlying price and futures price is called as basis. Basis is more stable and predictable than the movement of the prices of the underlying or the Futures price. Thus, arbitrageur would predict the basis and accordingly take positions in the cash and future markets.

EXHIBIT 3.8.1 Participants of Commodity Market





3.9 INTERMEDIARIES OF COMMODITY MARKETS

Commodity mutual funds, clearing houses, collateral managers, commodity brokers, members of the commodity exchanges, freight and forwarding agents, mandi operators, warehouse keepers and others, who are part of the vast batallion of intermediaries in the commodity markets, would soon be regulated by the commodity futures regulator the Forward Market Commission (FMC).

What is more, like their counterparts in the securities industry regulated by the Securities and the Exchange Board of India (Sebi), they will also have to chip in the registration fees that would go towards financing the FMC's activities in effective regulation of the commodity futures markets.

Currently, none of the intermediaries, not even the members of the commodity exchanges, are formally regulated by the FMC. Interestingly, this move will see dual registration and regulation of some of the stock broking entities which have opted to take membership of the Nationwide Multi Commodity Exchanges (NMCEs). A number of leading stock broking entities like Share Khan, Refco (India), Ashit Mehta and others have taken membership of the new NMCEs.

In this regard, a full new chapter will be soon be introduced in the Forward Contracts (Regulation) Act, 1952 which is silent on this whole issue of regulating the intermediaries. This new chapter will be part of other related aspects aimed at strengthening the FC(R) Act and the FMC's role in regulating India's fast-evolving commodity futures market. This and other amendments to the FC(R) Act have been awaiting the government's nod since 1998.

Included in the amendment of the FC(R) Act is also the permission for options trading, which too is currently banned.

A high level committee looking into widening the scope of the FC(R) Act 1952 as also the ways and means to strengthen the FMC has submitted its report to the government which has been cleared by the Rajya Sabha. after the Lok Sabha clears these amendments will be passed in the Parliament through a gazette notification.

Like in the securities industry, regulation of intermediaries of the commodity markets is also extremely important, more so because of the complexities involved in the grades, varieties and number of hands the commodity changes hands before the buyer/consumer/investor gets the commodity.

Interestingly, despite the existence of some 23 commodity exchanges, their 3,000 plus members too are not currently regulated by the FMC.

The new nationwide multi commodity exchanges (NMCEs) are expected to add further 1,000 members among themselves, some of which may be common to any of the three NMCEs.

The new move to regulate intermediaries would see the regulation even of the commodity mutual funds, which like in the developed economies, would be regulated by the FMC. A number of players in the commodity market, as also from international markets, are said to be keen to set up commodity specific mutual funds to take advantage of the emerging interest in the commodity markets.

It may be recalled that in her 'Integrated Report On Commodity Exchanges and the FMC' Farida Youssef (under the aegies of the World Bank Project for improvement of the commodities futures markets in India) had in October 2000 had highlighted the need to regulate the brokers in the interest of the customers.

Lastly, it may be mentioned here that given the rising interest in India's commodity markets, among the players in the international commodity markets there is expected to be alliances between the international commodity market players and Indian intermediaries.

In this direction too, Ms Youssef had indicated that the global futures industry is undergoing a period of

immense change, and previous international brokerage models may not longer be as appropriate a benchmark to guide India's development of its brokerage industry.

Given these aspects, the regulation of the commodity market intermediaries will be extremely essential.

3.10 PRODUCT SPECIFICATION

Commodities on which futures trading take place

At present, futures are available on the following commodities

Bullion	Gold and Silver
Oil & Oilseeds	Castor seeds, Soya Seeds, Castor Oil, Refined Soya Oil, Soya meal, Crude Palm Oil, Cotton seed, Oilcake, Cottonseed, Mentha oil
Spices	Pepper, Red Chilli, Jeera, Turmeric, Cardamom, Coriander
Metals	Copper, Nickel, Tin, Steel, Zinc, Aluminium
Fibre	Kapas, Long Staple Cotton, Medium Staple Cotton
Pulses	Chana
Cereals	Wheat, Maize
Energy	Crude oil, Furnace Oil, Natural Gas, Heating Oil
Others	Rubber, Guar Seed, Guar Gum, Sugar, Gur

* Since the exchanges continue to add new products, the above list may be outdated

Futures prices determination

Futures prices evolve from the interaction of bids and offers emanating from all over the country – which converge in the trading floor or the trading engine. The bid and offer prices are based on the expectations of prices on the maturity date.

Two methods generally used for predicting futures prices are fundamental analysis and technical analysis. The fundamental analysis is concerned with basic supply and demand information, such as, weather patterns, carryover supplies, relevant policies of the Government and agricultural reports. Technical analysis includes analysis of movement of prices in the past. Many participants use fundamental analysis to determine the direction of the market, and technical analysis to time their entry and exit.

Date of expiry of Contract

At NCDEX the contracts expire on 20th day of each month. If 20th happens to be a holiday the expiry day will be the previous working day.

Margins on Commodity future contracts

Generally commodity futures require an initial margin between 5-10% of the contract value. The exchanges levy higher additional margin in case of excess volatility. The margin amount varies between exchanges and commodities. Therefore they provide great benefits of leverage in comparison to the stock and index futures trade on the stock exchanges. The exchange also requires the daily profits and losses to be paid in/out on open positions (Mark to Market or MTM) so that the buyers and sellers do not carry a risk of not more than one day.



Following is a table showing the details regarding major commodities traded on MCX & NCDEX and their lot size, delivery centre and rupee movement.

MCX

Commodity	Quotation Units	Lot Size	Expiry Date	Delivery Centres	P/L per ₹ Movement
Gold	10 Grams	1 Kg	5th	Mumbai	100
				Ahmedabad	
Silver	1 Kg	30 Kg	5th	Amedabad	30
Copper	1 Kg	1 MT	30th / 31st	Mumbai	1000
Aluminium	1 Kg	2 MT	30th / 31st	Bhiwandi	5000
Zinc	1 Kg	5 MT	30th / 31st	Mumbai	5000
Crude Oil	1 Barrel	100 Barrels	15 th	Mumbai	100
Natural Gas	1 m.m.b.t.u.	1250 m.m.b.t.u.	20 th		1250
Refined Soyoil	10 Kg	10 MT	15 th	Indore	1000
Menthaoil	1 Kg	360 Kg	30th / 31st	Chaundasi	360
Potato	100 Kg	30 MT	15 th	Agra	300

NCDEX

Commodity	Quotation Units	Lot Size	Expiry Date	Delivery Centre	P/L per ₹ Movement
Guar Seed	100 Kg	10 MT	20 th	Jodhpur	100
Guar Gum	100 Kg	10 MT	20 th	Jodhpur	50
Chana	100 Kg	10 MT	20 th	Delhi	100
Soyoil -re-fined	10 Kg	10 MT	20 th	Indore	1000
Soyabean	100 Kg	10 MT	20 th	Indore	100
RM seed	100 Kg	10 MT	20 th	Jaipur	100
Castor seed	20 Kg	10 MT	20 th	Deesa	500
Jeera	100 Kg	3 MT	20 th	Unjha	30
Pepper	100 Kg	1 MT	20 th	Kochi	10
Chilli	100 Kg	5 MT	20 th	Guntur	50
Turmeric	100 Kg	5 MT	20 th	Nizamabad	50
Sugar	100 Kg	10 MT	20 th	Kolhapur	100
Gur	40 Kg	10 MT	20 th	Muzaffarnagar	250
Maize	100 Kg	10 MT	20 th	Nizamabad	100

The specifications are subject to change by the exchanges / FMC

The list given above covers only the popular commodities and not exhaustive.

Margin payable on commodity

The margins payable on each commodity at present are as follows:

Commodity	Initial margin
GOLD	5%
Gold Mini	5%
Silver	5%
Silver Mini	5%
Steel Long	5%
Steel Flat	5%
Crude Palm oil	4%
Ground nut oil	4%
RBD Palmolein	4%
Refined Soy Oil	4%
Rubber	5%
Soy Seed	4%
Black Pepper	8%
Kapas	5%
Castor oil	4%
Castor Seed	4%

3.11 HOW THE COMMODITY MARKET WORKS

3.11.1 Working Procedure

The futures market is a centralized market place for buyers and sellers from around the world who meet and enter into commodity futures contracts. Pricing mostly is based on an open cry system, or bids and offers that can be matched electronically. The commodity contract will state the price that will be paid and the date of delivery. Almost all futures contracts end without the actual physical delivery of the commodity.

There are two kinds of trades in commodities.



The first is the spot trade, in which one pays cash and carries away the goods.

The second is futures trade. The underpinning for futures is the warehouse receipt. A person deposits certain amount of say, goods X in a ware house and gets a warehouse receipt which allows him to ask

for physical delivery of the good from the warehouse but someone trading in commodity futures need not necessarily possess such a receipt to strike a deal. A person can buy or sell a commodity future on an exchange based on his expectation of where the price will go.

Futures have something called an expiry date, by when the buyer or seller either closes (square off) his account or give/take delivery of the commodity. The broker maintains an account of all dealing parties in which the daily profit or loss due to changes in the futures price is recorded. Squaring off is done by taking an opposite contract so that the net outstanding is nil.

For commodity futures to work, the seller should be able to deposit the commodity at warehouse nearest to him and collect the warehouse receipt. The buyer should be able to take physical delivery at a location of his choice on presenting the warehouse receipt. But at present in India very few warehouses provide delivery for specific commodities.

FIG 1: Following diagram gives a fair idea about working of the commodity market

Working of the Commodity Market



A future contract is an agreement between two parties: a short position, the party who agrees to deliver a commodity, and a long position, the party who agrees to receive a commodity.

In every commodity contract, everything is specified: the quantity and quality of the commodity, the specific price per unit, and the date and method of delivery. The Price of a futures contract is represented by the agreed-upon price of the underlying commodity or financial instruments that will be delivered in the future.

3.11.2 Delivery Process

(a) Procedures for Delivery:

- Open a Beneficiary Demat account

(b) Information Required for delivery:

- Commodity code
- Quality
- Location/branch preference for physical receipt/delivery of commodities
- Demat Indicator Delivery process requires

(c) Delivery Process Requirements:

- Delivery information submitted on Expiry date.
- This is done through the delivery request window on the Trading Terminal.
- Matching delivery information is obtained.

(d) Validation of Delivery Information:

- On Client's Net Open Position
- On Delivery lot for commodity
- Excess quantity rejected and cash settled
- Matched delivery information

(e) MATCHING PARAMETERS:

- Commodity
- Quantity
- Location
- Branch
- Matching limited to the total warehouse capacity
- Settlement through Depository.
- Settlement Schedule in Settlement Calendar

Today Commodity trading system is fully computerized. Traders need not visit a commodity market to speculate. With online commodity trading they could sit in the confines of their home or office and call the shots.

The commodity trading system consists of certain prescribed steps or stages as follows:

Trading	Clearing	Settlement
-Order receiving -Execution -Matching -Reporting -Surveillance -Price limits -Position limits	-Matching -Registration -Clearing -Clearing limits -Notation -Margining -Price limits -Position limits -Clearing house	-Marking to market -Receipts and payments -Reporting -Delivery upon expiration or maturity



3.12 CLEARING HOUSE OPERATIONS

3.12.1 Introduction

Exchange-traded derivatives (ETD) are those derivatives products that are traded in stock Exchanges. Clearing House acts as an intermediary to all related transactions, and takes Initial margin from both sides of the trade to act as a guarantee.

Clearing House protects the financial integrity of markets by serving as the counterparty to every transaction and virtually eliminating credit risk. It is responsible for settling trading accounts, clearing trades, collecting and maintaining collateral funds, regulating delivery and reporting trading data. The financial integrity of futures and options markets depends on the robustness of their arrangements for clearing and settling trades.

General Aspects of Clearing House

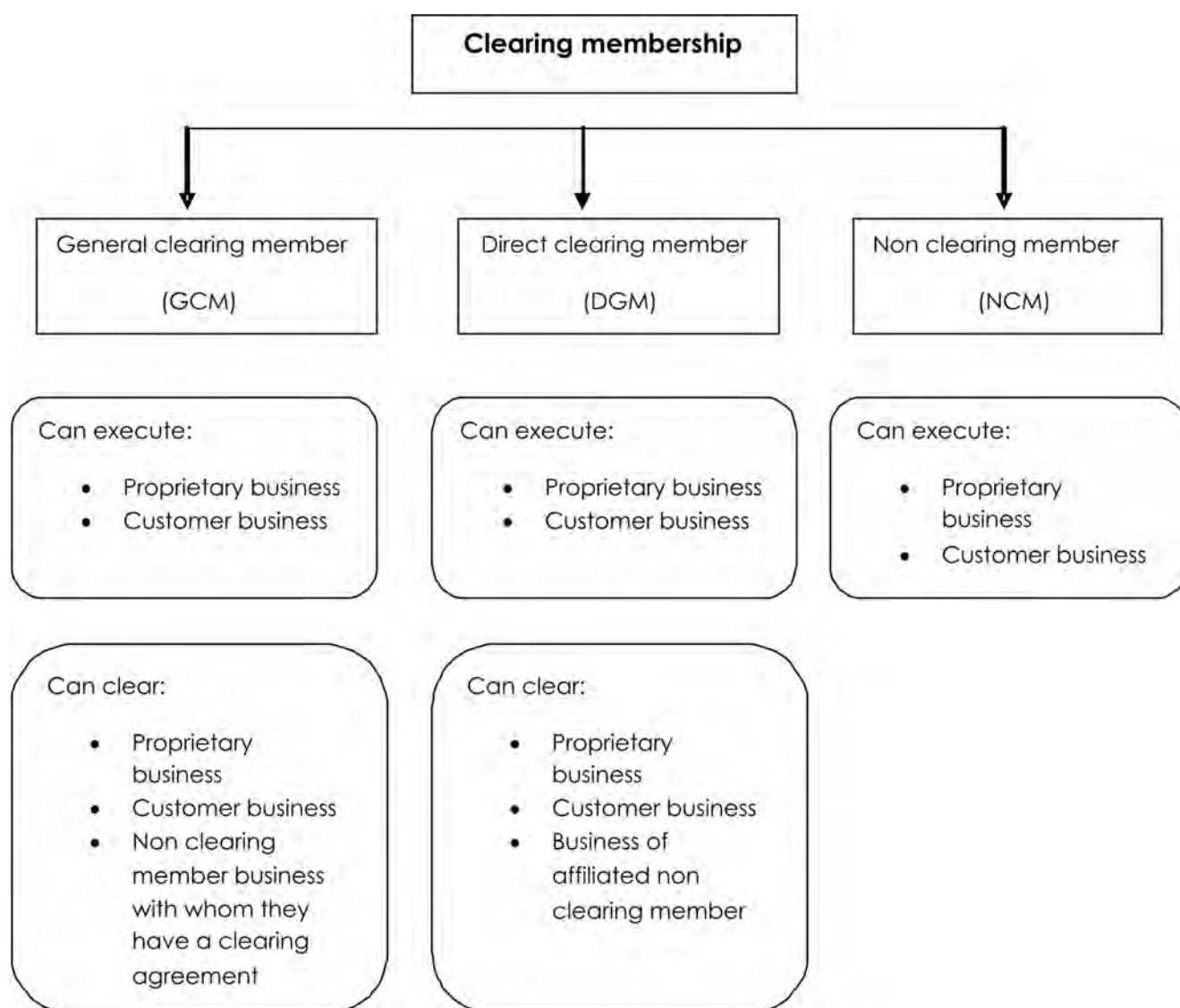
A derivatives clearing house may be a department within the exchange for which it clears or an independent legal entity. If organized as an independent legal entity, the clearing house is typically owned by the exchange for which it clears or by its clearing members. Historically, a derivatives exchange was typically owned by its members (primarily brokers, banks, investment companies and insurance companies). The members were also generally the exchange's largest users.

When a trade is executed, Clearing House stands between the buyer and seller as counterparty of both contractual partners. The Clearing House enables the parties of the transaction to make further decisions fully independent of each other and limit counterparty risks to a single contractual partner.

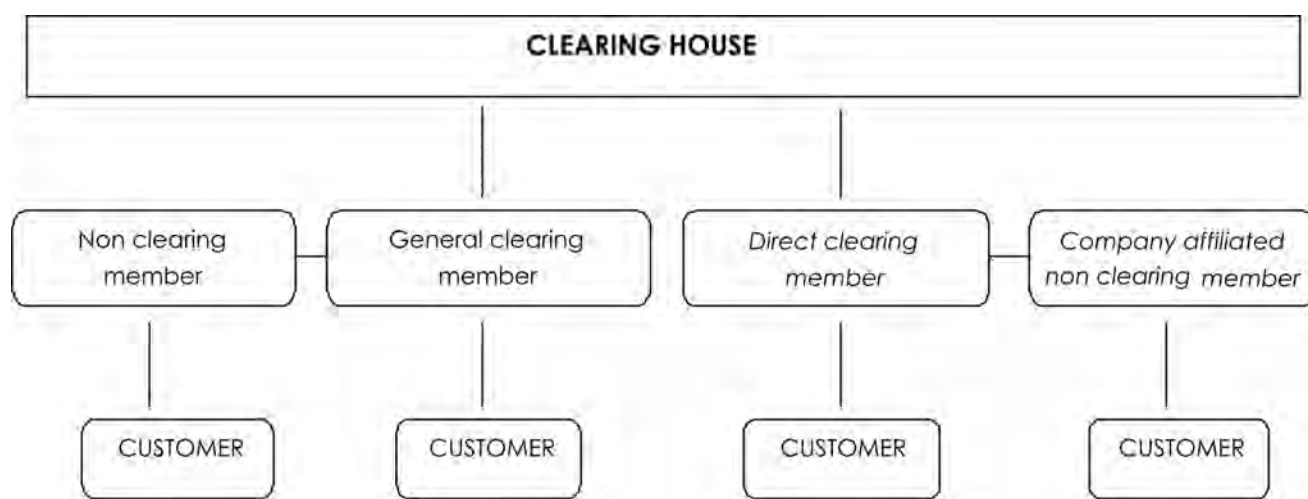
3.12.2 Clearing Structure

The derivatives clearing house restricts direct participation in the clearing process to the most creditworthy subset of the exchange's members; these are those clearing members that have a principal relationship with the clearing house in its capacity as central counterparty for all contracts submitted and accepted for clearing. Market participants that are not clearing members must establish an account relationship directly or through another party (a non-clearing broker) with a clearing member to effect settlement. Generally, there is no contractual relationship between the derivatives clearing house and these non clearing member market participants.

A General Clearing Member (GCM) may settle its own transactions, those of its customers, as well as those of market participants which do not hold a clearing license (Non Clearing Members–NCM). A Direct Clearing Member (DCM) is entitled to clear only its own transactions, those of its customers, and those of its corporate affiliates which do not hold a clearing license.



If a market participant does not itself hold a Clearing License, it must clear its transactions via a GCM or a company-affiliated DCM. In such cases, the contractual party of the Non-Clearing Member (NCM) will not be the clearing house, but rather the GCM or company-affiliated DCM, which in turn is the contractual party of the Clearing House.



Each Clearing Member is obliged to demand from its customers and NCMs margin amounts which are at least as high as the levels that result from the clearing house method of calculation.

3.12.3 Clearing and Settlement

Most futures contracts do not lead to the actual physical delivery of the underlying asset. The settlement is done by closing out open positions, physical delivery or cash settlement. All these settlement functions are taken care of by an entity called clearinghouse or clearing corporation. National Securities Clearing Corporation Limited (NSCCL) undertakes clearing of trades executed on the NCDEX. The settlement guarantee fund is maintained and managed by NCDEX.

(1) Clearing

Clearing of trades that take place on an exchange happens through the exchange clearing house.

A clearing house is a system by which exchanges guarantee the faithful compliance of all trade commitments undertaken on the trading floor or electronically over the electronic trading systems. The main task of the clearing house is to keep track of all the transactions that take place during a day so that the net position of each of its members can be calculated. It guarantees the performance of the parties to each transaction.

Typically it is responsible for the following:

- Effecting timely settlement.
- Trade registration and follow up.
- Control of the evolution of open interest.
- Financial clearing of the payment flow.
- Physical settlement (by delivery) or financial settlement (by price difference) of contracts.
- Administration of financial guarantees demanded by the participants.

The clearing house has a number of members, who are mostly financial institutions responsible for the clearing and settlement of commodities traded on the exchange. The margin accounts for the clearing house members are adjusted for gains and losses at the end of each day (in the same way as the individual traders keep margin accounts with the broker).

(2) Clearing Mechanism

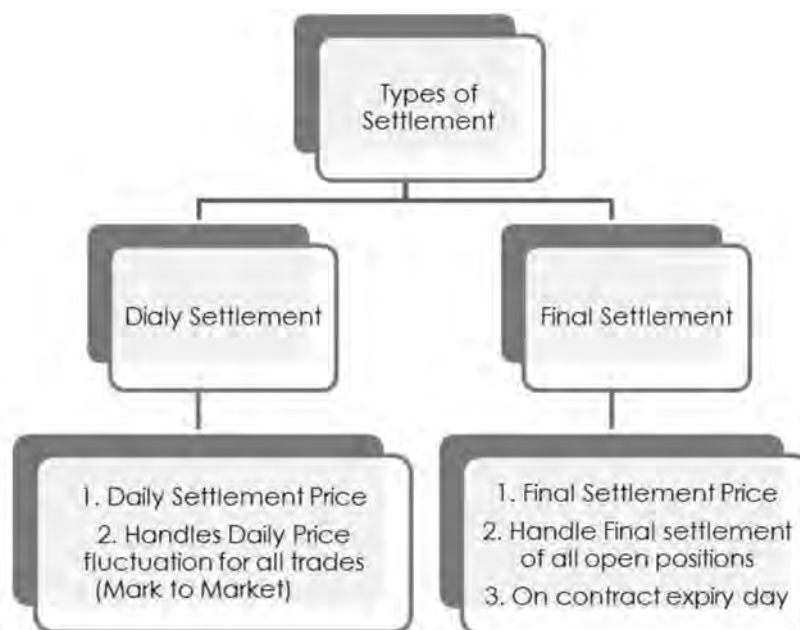
Only clearing members including professional clearing members (PCMs) are entitled to clear and settle contracts through the clearing house.

The clearing mechanism essentially involves working out open positions and obligations of clearing members. This position is considered for exposure and daily margin purposes. The open positions of PCMs are arrived at by aggregating the open positions of all the TCMs clearing through him, in contracts in which they have traded. A TCM's open position is arrived at by the summation of his clients' open positions, in the contracts in which they have traded. Client positions are netted at the level of individual client and grossed across all clients, at the member level without any set-offs between clients. Proprietary positions are netted at member level without any set-offs between client and proprietary positions.

(3) Settlement

Futures contracts have two types of settlements, the MTM settlement which happens on a continuous basis at the end of each day, and the final settlement which happens on the last trading day of the futures contract.

- **Daily settlement price:** Daily settlement price is the consensus closing price as arrived after closing session of the relevant futures contract for the trading day. However, in the absence of trading for a contract during closing session, daily settlement price is computed as per the methods prescribed by the exchange from time to time.
- **Final settlement price:** Final settlement price is the closing price of the underlying commodity on the last trading day of the futures contract. All open positions in a futures contract cease to exist after its expiration day.



(4) Settlement mechanism

Settlement of commodity futures contracts is a little different from settlement of financial futures which are mostly cash settled. The possibility of physical settlement makes the process a little more complicated.



(a) Daily mark to market settlement

Daily mark to market settlement is done till the contract expiry. This is done to take care of daily price fluctuation for all trades. All the open positions of the members are marked to market at the end of the day and the profit/ loss is determined as below:

On the day of entering into the contract, it is the difference between the entry value and daily settlement price for that day.

On any intervening days, when the member holds an open position, it is the difference between the daily settlement price for that day and the previous day's settlement price. On the expiry date if the member has an open position, it is the difference between the final settlement price and the previous day's settlement price.

(b) Final settlement

On the date of expiry, the final settlement price is the spot price on the expiry day. The spot prices are collected from members across the country through polling. The polled bid/ ask prices are bootstrapped and the mid of the two bootstrapped prices is taken as the final settlement price.

The responsibility of settlement is on a trading cum clearing member for all trades done on his own account and his client's trades. A professional clearing member is responsible for settling all the participants' trades which he has confirmed to the exchange.

EXHIBIT 12.1: Settlement Pay-In and Pay-Out Mechanism

PAY-IN	PAY-OUT
Commodity • Seller ensures Demat of commodities prior to Pay-in • Instruction to DP by seller to move commodities to Clearing Member Pool Account • Pay-in of commodities on Settlement Date thru Clearing member pool account	Commodity • Credit given into the Buyer member CM Pool A/c • Instruction by Member to transfer from CM pool to buyer client's Demat account • Subsequent Remat of commodities and physical movement handled by buyer
FUNDS • Pay-in of funds – Thru the Clearing bank of the Member on the Pay-in day.	FUNDS • Funds pay-out is done into the designated bank account of the Member with the Clearing bank

3.12.4 Process flow of settlement of Commodity Derivative's – Future Contracts

The process flows in the event of physical settlement of commodities are different from that of other underlying. The process flow is as follows:

a) Delivery Notice Period

Unlike in the case of say equity futures, in the case of commodities, a seller has an option to give notice of delivery. This option is given during a period identified as 'delivery notice period' (DNP). In a manner similar to options markets such contracts are then assigned to a buyer. The intention of this notice is to allow verification of delivery and to give adequate notice to the buyer of a possible requirement to take delivery. Typically in all commodity exchanges, delivery notice is required to be supported by a warehouse receipt. The warehouse receipt is the proof for the quantity and quality of commodities being delivered. Some of exchanges have certified laboratories for verifying the quality of goods. In these exchanges the seller has to produce a verification report from these laboratories along with

delivery notice. The seller who notifies the clearing house about delivery of the commodity cannot net off his position. Position should be kept open till the time delivery is done. After delivery, the position will be closed out by the clearing house.

b) Assignment

Whenever delivery notices are given by the seller, the clearing house identifies the buyer to whom the delivery notice may be assigned. One approach of assignment is to display the delivery notice and allow buyers wishing to take delivery to bid for taking delivery. Among the international exchanges, BMF, CBOT, CME display delivery notices. Alternatively, the clearing houses may assign deliveries to buyers on some basis.

Clearing house assigns the delivery intentions to open long positions. Assignment is done typically either on random basis or first-in-first out basis. In some exchanges (CME) the buyer has the option to give his preference for delivery location. The clearing house decides on the daily delivery order rate at which delivery will be settled. Delivery order rate depends on the spot rate of the underlying adjusted for discount/ premium for quality and freight costs. The discount/premium for quality and freight costs are published by the clearing house before introduction of the contract. The most active spot market is normally taken as the benchmark for deciding spot prices. Alternatively, the delivery rate is determined based on the previous day closing rate for the contract or the closing rate for the day.

c) Delivery

After the assignment process, clearing house/exchange issues a delivery order to the buyer. Exchange also informs the respective warehouse about the identity of the buyer. The buyer is required to deposit a certain percentage of the contract amount with the clearing house as margin against the warehouse receipt. The period available for the buyer to take physical delivery is stipulated by the exchange. Buyer or his authorized representative in presence of seller or his representative takes the physical stocks against the delivery order. Proof of physical delivery having been effected is forwarded by the seller to the clearing house and the invoice amount is credited to the seller's account. If a seller does not give notice of delivery then at the expiry of the contract the positions are cash settled by price difference exactly as in cash settled equity futures contracts. Penalty is imposed on the seller for not marking open positions for delivery.

- (i) Clearing Member who has Short position in the contract sends a delivery notice to the clearing house about its intent to deliver the underlying. This happens before the last day of the delivery notice period.
- (ii) Some clearing houses request a report from the entire clearing member who has LONG positions in the contract.
- (iii) Clearing House allocates the delivery to the clearing members who has LONG positions.
- (iv) Clearing House notifies the allocated buyer-clearing member (LONG Position holder) about the delivery allocation that includes the seller-clearing member information.
- (v) Clearing House notifies the seller-clearing member (LONG Position holder) about the delivery allocation that includes the buyer-clearing member information against their delivery notice.
- (vi) Upon receipt of the names of the buyer-clearing member obligated to accept delivery from him, the seller-clearing member shall prepare invoices addressed to its assigned buyers describing the commodity to be delivered to each such buyer and, if applicable, the delivery location. Such invoices shall show the amount which buyers must pay to sellers in settlement of the actual deliveries, based on the delivery prices established by the Clearing House for that purpose, adjusted for applicable premiums, discounts, storage charges, premium charges, premium for FOB conveyance, quantity variations and other items for which provision is made in these Rules relating to contracts. Such invoices shall be in the form designated by the Exchange.



- (vii) Such invoices shall be delivered to the Clearing House by seller-clearing member
- (viii) Upon receipt of such invoices, the Clearing House shall promptly make them available to buyers to whom they are addressed.
- (ix) A buyer receiving a Delivery Notice from the Clearing House shall make payment in same day funds for the invoicing price and based on receipt of payment can take the delivery.

3.13 RISK MANAGEMENT

3.13.1 Overview

As a central counterparty to its clearing members, a derivatives clearing house assumes a variety of risks which must be managed. More specifically, the clearing house must As a central counterparty to its clearing members, a derivatives clearing house assumes have adequate risk management measures in place to cover

- A) Default of a clearing member
- B) Default of a settlement bank , and
- C) Number of other risks.

A) Defaults of Clearing Members

The defaults of clearing members on their outstanding contracts may expose the clearing house to principal (delivery) risk, replacement cost risk and liquidity risk.

Principal Risk

Can occur if contracts are settled through delivery of the underlying commodity or instrument. For example, if a commodity or underlying instrument is delivered prior to receipt of payment, the deliverer risks losing its full value. If payment is made prior to delivery, the payer risks losing the full value of the payment.

Replacement Cost Risk

The clearing house has an obligation to the clearing member on the other side of the contract, so that it must take a position identical to that on which the clearing member has defaulted. However, as time passes after the default, market prices will tend to move away from the level that existed at the time the defaulting clearing member last posted margin to cover its obligations under the contract. As a result, the obligations of the clearing house may fluctuate from the time of the default until the clearing house covers and closes out the position.

Liquidity Risk

Clearing house must fulfill its payment obligations without delay even if one or more members default or their performance of their settlement obligations is delayed. This is particularly critical because, owing to the central counterparty's central position, any doubts about its ability to conclude settlement may create systemic disturbances.

B) Settlement Bank Failures

If clearing houses effect money settlements through private settlement banks, they are exposed to the risk of settlement bank failure. Such failures could expose a clearing house to both credit risk and liquidity risk.

C) Other Risks to which the Derivatives Clearing Houses may be exposed**i) Market Risk:**

A clearing house may be subject to market risk if it accepts securities as margin. Clearing houses usually address this market risk by discounting the value of non-domestic currencies and securities posted as margin (i.e. by subjecting them to “haircuts”) and by marking them to market daily.

ii) Currency Exchange Risk

If the clearing house accepts non-domestic currency as margin or if it clears contracts that are denominated and settled in a non-domestic currency, but that are collateralized with domestic currency or assets denominated in domestic currency. Clearing houses usually address this risk by subjecting non-domestic currency and assets denominated in non-domestic currency to haircuts and by marking all

iii) Operational risk:

Any operational problem that delays settlement or prevents the clearing house from resolving a default could increase counterparty exposures. In addition, an operational breakdown might prevent a clearing house from monitoring its exposures.

iv) Legal risks:

The enforceability of netting arrangements, the ability to realize a defaulting member's assets, the finality of payments and securities transfers, the enforceability of the clearing house's internal rules and the general legal framework applicable in the jurisdiction in which the clearing house operates must be subject to a high degree of legal certainty.

3.13.2 Risk Management Procedures of Clearing House

- Imposition of membership requirements, including capital requirements, and an ongoing monitoring of compliance with such requirements in order to limit the likelihood of defaults;
- Imposition of security deposit, collateral requirements and exposure ceilings to limit loss by using more than one settlement bank. Another technique to minimize the risk of settlement bank failure is to convert customer cash held in deposits at the settlement bank into securities, e.g. Treasury bonds, held by the settlement bank. While a cash deposit account creates a debtor/creditor relationship between the bank and its customer for the amount on deposit and a customer claim against the assets of the bank in the event of its insolvency, customer securities held by a settlement bank are segregated for the benefit of the customer on its books, are not included in its assets upon its insolvency and can be recovered by the customer free of any claims against the bank.

3.14 BASIS AND BASIS RISK

The principle of convergence of price states that futures price and spot price converge on the date of maturity. If this happens at the time of exiting, a perfect hedge is possible. However, efficiency of hedge is not as much dependent upon convergence as it is dependent upon the correlation of futures and spot price. This aspect can be understood through basis, which is defined as difference of futures price and the spot price. If today the futures and spot prices are F_0 and S_0 respectively, the basis is

$$B_0 = F_0 - S_0$$

Note that in a normal market the basis will be positive, while in an inverted market it shall be negative. The principle of convergence assumes that basis shall become zero on the maturity date futures and spot prices being equal. At the time of setting up the hedge, by going long or short on futures the basis is known.

During the period of hedge, spot prices as well as futures prices change with time and are unknown.



At the end of the period of the hedge (when one squares up the position in the futures market) if the futures and spot prices are F_1 and S_1 respectively, then the basis at the end of hedge period is

$$B_1 = F_1 - S_1$$

Let us look at the gain or loss of the hedger in the spot and futures market separately. If the hedger were long on the underlying asset valued at S_0 today, at the end of period of hedge his payoff will be

$$\text{Gain/loss in the spot market} = S_1 - S_0$$

The hedger went short on futures market at F_0 and bought back at F_1 at the end of period of hedge. His payoff on the futures market is

$$\text{Gain /loss in the futures market} = F_0 - F_1$$

The total gain/loss on the combined position in spot and futures markets is

$$\text{Net gain/loss} = S_1 - S_0 + F_0 - F_1 = (F_0 - S_0) - (F_1 - S_1)$$

$$= B_0 - B_1$$

= difference of basis at start and end of hedge

For perfect hedge the net gain or loss must be zero, and hence hedge will be perfect if the difference in basis is zero. The hedger will achieve his objective if he minimizes the differential of basis. If he is unhedged the price risk is

$$\text{Price risk} = S_1 - S_0$$

With hedging through his risk is limited to difference in basis, which is expected to be much smaller than the price risk. The difference in the basis is referred as basis risk, being the risk borne by the hedger. By hedging, the larger price risk is replaced by much smaller basis risk. Basis risk arises due to mismatch of positions in the physical and futures markets, as discussed earlier.

Besides quality of the asset, the basis risk also arises due to the time of maturity of the futures contract and the period for which underlying is to be hedged. For example, consider a sugarcane trader who would like to get rid of his stock on a particular date in April; whereas future contract expires on say 25 April. Since the time of exiting the exposure on asset owned and the time of square up of the futures contract will not be the same, he would either be over hedged (when futures position is open and position in physical asset is closed) or under hedged (when futures position is closed prior to closure of position in the asset) with respect to time. This implies that the principle of convergence cannot be made use of. Some element of basis risk will remain though the basis reduces as the time of maturity decreases.

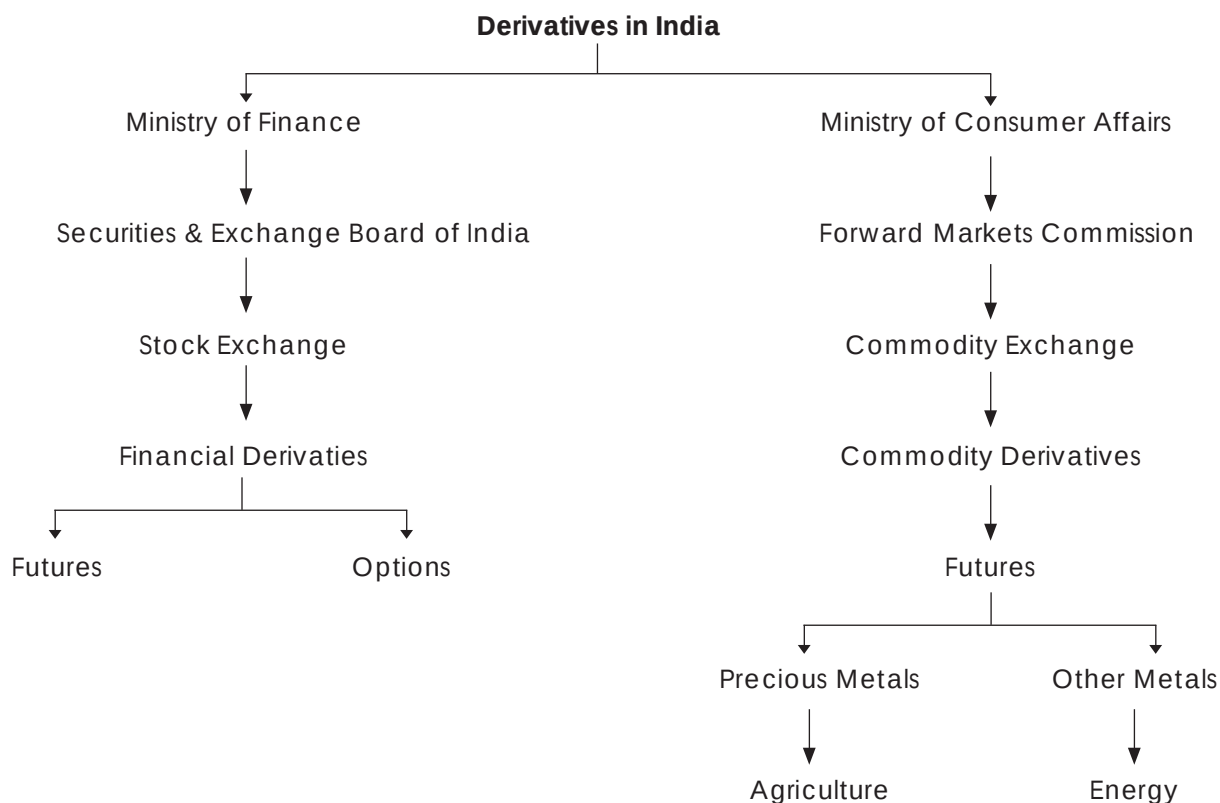
3.15 COMMODITY FUTURES AND ITS MECHANISM

A commodity may be defined as an article, a product or material that is bought and sold. It can be classified as every kind of movable property, except Actionable Claims, Money & Securities.

The general understanding about the commodity trading futures market is that it is a very complex and difficult to analyze market. However on the other hand it is not so! Infact there are a few basic facts that people need to know of which will change their perception about what the commodity trading futures market is and how they work. The basic knowledge is that the commodity trading futures market or the exchange market as it is known is a public marketplace where the sale or purchase of commodities takes place. These sales and purchases are done at an agreed price so that commodities are delivered at a specified date. The broker is a person who needs to do the purchase or sales of the commodities. The broker is also a part of the organized exchange and the deal is completed according to the

terms and conditions as given in the standardized futures contract. The main thing that distinguishes the futures commodity trading market and a commodity market where commodities are bought and sold is that the futures market works with the help of contract agreements that follow a standard procedure. These agreements are responsible for delivery of a particular commodity at an amount as specified for a future month. It does not include the immediate transfer of commodities ownership. In short the buying and selling in the commodity trading futures market does not need the buyer or the seller to be the owner of the particular commodity that they are trading for. With futures the main concern is receiving the delivery or making the delivery of the commodity, however the futures should not be bought or sold during the month of delivery. The previous sale also can be cancelled at any time with respect to the equal offsetting sale. If the sale is cancelled before the commodities delivery month then the trade cancels out completely. In this case the commodity is not received by the buyer or delivered by the seller. In reality there is only a very small percentage very specifically less than 2% of the total of all futures commodity trading contracts that are settled or entered into through the deliveries. A larger part shows that there is a lot of cancellation of deliveries of commodities even before the delivery month in the manner that is described above. This forms the basic mechanics or the functioning of the commodity trading futures market. Subscription is easy as you can subscribe either by Cheque Deposit, Online Money Transfer, Cash Deposit or Credit Card Payment.

Structure of Derivatives Markets in India



3.15.1 To qualify as a commodity for futures trading, an article or a product has to meet some basic characteristics:

- (i) The product must not have gone through any complicated manufacturing activity, except for certain basic processing such as mining, cropping, etc. In other words, the product must be in a basic, raw, unprocessed state. There are of course some exceptions to this rule. For example, metals,



which are refined from metal ores, and sugar, which is processed from sugarcane.

- (ii) The product has to be fairly standardized, which means that there cannot be much differentiation in a product based on its quality. For example, there are different varieties of crude oil. Though these different varieties of crude oil can be treated as different commodities and traded as separate contracts, there can be a standardization of the commodities for futures contract based on the largest traded variety of crude oil. This would ensure a fair representation of the commodity for futures trading. This would also ensure adequate liquidity for the commodity futures being traded, thus ensuring price discovery mechanism.
- (iii) A major consideration while buying the product is its price. Fundamental forces of market demand and supply for the commodity determine the commodity prices.
- (iv) Usually, many competing sellers of the product will be there in the market. Their presence is required to ensure widespread trading activity in the physical commodity market.
- (v) The product should have adequate shelf life since the delivery of a commodity through a futures contract is usually deferred to a later date (also known as expiry of the futures contract).

3.15.2 Objectives of Commodity Futures

- Hedging with the objective of transferring risk related to the possession of physical assets through any adverse moments in price. Liquidity and Price discovery to ensure base minimum volume in trading of a commodity through market information and demand supply factors that facilitates a regular and authentic price discovery mechanism.
- Maintaining buffer stock and better allocation of resources as it augments reduction in inventory requirement and thus the exposure to risks related with price fluctuation declines. Resources can thus be diversified for investments.
- Price stabilization along with balancing demand and supply position. Futures trading leads to predictability in assessing the domestic prices, which maintains stability, thus safeguarding against any short term adverse price movements. Liquidity in Contracts of the commodities traded also ensures in maintaining the equilibrium between demand and supply.
- Flexibility, certainty and transparency in purchasing commodities facilitate bank financing. Predictability in prices of commodity would lead to stability, which in turn would eliminate the risks associated with running the business of trading commodities. This would make funding easier and less stringent for banks to commodity market players.

3.15.3 Benefits of Commodity Futures Markets

The primary objectives of any futures exchange are authentic price discovery and an efficient price risk management. The beneficiaries include those who trade in the commodities being offered in the exchange as well as those who have nothing to do with futures trading. It is because of price discovery and risk management through the existence of futures exchanges that a lot of businesses and services are able to function smoothly.

a) Price Discovery:- Based on inputs regarding specific market information, the demand and supply equilibrium, weather forecasts, expert views and comments, inflation rates, Government policies, market dynamics, hopes and fears, buyers and sellers conduct trading at futures exchanges. This transforms in to continuous price discovery mechanism. The execution of trade between buyers and sellers leads to assessment of fair value of a particular commodity that is immediately disseminated on the trading terminal.

b) Price Risk Management: - Hedging is the most common method of price risk management. It is strategy of offering price risk that is inherent in spot market by taking an equal but opposite position in the futures market. Futures markets are used as a mode by hedgers to protect their business from

adverse price change. This could dent the profitability of their business. Hedging benefits who are involved in trading of commodities like farmers, processors, merchandisers, manufacturers, exporters, importers etc.

c) Import- Export competitiveness: - The exporters can hedge their price risk and improve their competitiveness by making use of futures market. A majority of traders which are involved in physical trade internationally intend to buy forwards. The purchases made from the physical market might expose them to the risk of price risk resulting to losses. The existence of futures market would allow the exporters to hedge their proposed purchase by temporarily substituting for actual purchase till the time is ripe to buy in physical market. In the absence of futures market it will be meticulous, time consuming and costly physical transactions.

d) Predictable Pricing: - The demand for certain commodities is highly price elastic. The manufacturers have to ensure that the prices should be stable in order to protect their market share with the free entry of imports. Futures contracts will enable predictability in domestic prices. The manufacturers can, as a result, smooth out the influence of changes in their input prices very easily. With no futures market, the manufacturer can be caught between severe short-term price movements of oils and necessity to maintain price stability, which could only be possible through sufficient financial reserves that could otherwise be utilized for making other profitable investments.

e) Benefits for farmers/Agriculturalists: - Price instability has a direct bearing on farmers in the absence of futures market. There would be no need to have large reserves to cover against unfavorable price fluctuations. This would reduce the risk premiums associated with the marketing or processing margins enabling more returns on produce. Storing more and being more active in the markets. The price information accessible to the farmers determines the extent to which traders/processors increase price to them. Since one of the objectives of futures exchange is to make available these prices as far as possible, it is very likely to benefit the farmers. Also, due to the time lag between planning and production, the market-determined price information disseminated by futures exchanges would be crucial for their production decisions.

f) Credit accessibility: - The absence of proper risk management tools would attract the marketing and processing of commodities to high-risk exposure making it risky business activity to fund. Even a small movement in prices can eat up a huge proportion of capital owned by traders, at times making it virtually impossible to pay-back the loan. There is a high degree of reluctance among banks to fund commodity traders, especially those who do not manage price risks. If in case they do, the interest rate is likely to be high and terms and conditions very stringent. This possesses a huge obstacle in the smooth functioning and competition of commodities market. Hedging, which is possible through futures markets, would cut down the discount rate in commodity lending.

g) Improved product quality: - The existence of warehouses for facilitating delivery with grading facilities along with other related benefits provides a very strong reason to upgrade and enhance the quality of the commodity to grade that is acceptable by the exchange. It ensures uniform standardization of commodity trade, including the terms of quality standard: the quality certificates that are issued by the exchange-certified warehouses have the potential to become the norm for physical trade.

h) Commodities as an asset class for diversification of portfolio risk:- Commodities have historically an inverse correlation of daily returns as compared to equities. The skewness of daily returns favors commodities, thereby indicating that in a given time period commodities have a greater probability of providing positive returns as compared to equities. Another aspect to be noted is that the "sharpe ratio" of a portfolio consisting of different asset classes is higher in the case of a portfolio consisting of commodities as well as equities. Thus, an Investor can effectively minimize the portfolio risk arising due to price fluctuations in other asset classes by including commodities in the portfolio.



i) Commodity derivatives markets are extremely transparent in the sense that the manipulation of prices of a commodity is extremely difficult due to globalisation of economies, thereby providing for prices benchmarked across different countries and continents. For example, gold, silver, crude oil, natural gas, etc. are international commodities, whose prices in India are indicative of the global situation.

j) An option for high net worth investors: With the rapid spread of derivatives trading in commodities, the commodities route too has become an option for high net worth and savvy investors to consider in their overall asset allocation.

k) Useful to the producer: Commodity trade is useful to the producer because he can get an idea of the price likely to prevail on a future date and therefore can decide between various competing commodities, the best that suits him.

l) Useful for the consumer: Commodity trade is useful for the consumer because he gets an idea of the price at which the commodity would be available at a future point of time. He can do proper costing/ financial planning and also cover his purchases by making forward contracts. Predictable pricing and transparency is an added advantage.

3.15.4 What Makes Commodity Trading Attractive?

- A good low-risk portfolio diversifier
- A highly liquid asset class, acting as a counterweight to stocks, bonds and real estate.
- Less volatile, compared with, equities and bonds.
- Investors can leverage their investments and multiply potential earnings.
- Better risk-adjusted returns.
- A good hedge against any downturn in equities or bonds as there is
- Little correlation with equity and bond markets.
- High co-relation with changes in inflation.
- No securities transaction tax levied.

3.15.5 Differences—Commodity and Financial Futures

Apart from the difference in the underlying assets, financial futures and commodity futures are substantially different from each other in the following respects:

a) Valuation

Financial futures are easier to understand as the cost of carry model for its valuation applies. The argument of arbitrage also holds because of the absence of convenience yield in financial futures. Financial futures involve financial instruments which do not have consumption value. The consumption value makes valuation of futures contracts on commodities difficult.

b) Delivery and Settlement

The provisions of delivery are applicable equally to commodities and financial futures. In case of financial futures delivery of underlying assets is prompt and hassle free, and so is its settlement. Further, there are no costs of transportation, storage, or insurance, etc. involved in financial futures. For futures on financial assets the price adjustment on account of discrepancy in quality of what was contracted and what is being delivered, is not required. Quality of underlying asset is immaterial in case of financial products, whereas there is ample scope of controversy over quality in case of commodity futures. In

case of futures on indices or intangibles the underlying is non-deliverable and futures contracts on them are necessarily cash settled.

c) Contract Features and Life

Commodity futures are governed by seasons and perishable nature of the underlying asset. The delivery is linked to the availability, and therefore contracts specifications have to consider physical characteristics of the underlying assets. Futures contracts on commodities normally do not exceed 90 days, while there is no such limitation on the financial futures. Financial futures can have much longer life, though generally maturity of many financial futures is kept at 90 days.

d) Supply and Consumption Patterns

In case of financial products, such as stocks, indices, and foreign exchange, the supply can be considered as unlimited and independent of weather and seasons. The supply in case of financial products does not suffer from vagaries of nature. The supply of commodities depends upon factors on which we do not have any control. The total supply is dependent upon weather, storage capacity, shelf life, etc. Further, the supply of most commodities (agricultural products) is confined to the harvesting period, while the consumption is uniform throughout the year. Deterioration in value of commodities with time is another phenomenon that does not affect futures on financial products.

f) Futures Contract on Commodities

Futures contract on commodities have same features as any other futures contract on financial asset. Significant differences arise in the commodity futures in two areas—extremely elaborate description of the quality attributes of the commodity, and procedure for settlement by delivery, deliverable quality, place of delivery, etc. Such complexities do not arise in case of futures contracts on financial assets.

Futures contracts on commodities have specific quality requirements. The price needs to be adjusted for the difference in the quality specified in the contract and the quality being delivered. For example, there is significant difference in the price of basmati rice and ordinary rice. What is deliverable against a futures contract needs to be specified. Besides, the exchange also has to provide for reasonable time for both the buyer and the seller to arrange for giving/taking delivery of the underlying asset. Usually futures contract on commodities provide for delivery notice period when parties are required to disclose the intentions of settlement by delivery.

Futures contracts on commodities can be settled in any of the three ways described in the earlier chapter, i.e. by physical delivery, by cash settlement, or by closing out. Settlement by closing out or by cash has the same form in commodities as is in financial assets. However, unlike futures contracts on financial assets the settlement of futures on commodity by delivery requires special mention. Settlement of commodity futures by delivery is cumbersome. Financial assets are either non-deliverable (as an index) or do not have quality/ time limitations.

In case of settlement by delivery the exchange has to provide for ascertainment of the quality and price adjustment, location of the delivery, adjustment of taxes and freight, the delivery logic at the option of the seller or buyer or both, and assignment. All these issues are dealt extensively in the specification of the futures contract. This makes the task of designing of the futures contract more onerous.

Assignment refers to the matching of short and long positions. For example, if the delivery is at the option of the seller the exchange has to find a willing buyer and devise rules for assigning delivery to a specific buyer. If the delivery logic is compulsory (all open positions at the expiry of futures contract are to be settled by delivery) the problem of assignment does not arise as for each short position there is a matching long position.

3.15.6 Pricing Commodity Futures

The relationship between futures prices and the price of the underlying asset is explained. There are several



important differences between a forward contract. These are :

- A forward contract is intended for physical delivery of commodity while most of the futures contracts are settled without physical delivery.
- No margins are involved in forward contracts
- There is no daily settlement of forward contracts
- Forward contracts are usually customized contracts whereas futures contracts are standardized contracts traded on an exchange

It is easier to examine the relationship between forward price and spot price. The study of futures prices becomes rather complex on account of the aforesaid factors, apart from the aspect of tax and transaction costs. However, it is observed that the forward price for a contract with a certain delivery date is the same as the futures price for a contract with the same delivery date, when the interest rate is constant and same for all maturities. It can be assumed that the analysis for forward prices is equally applicable to futures prices, especially for short maturity contracts.

Again, interest is usually compounded on a yearly or half-yearly basis. However, in case of derivatives, interest is compounded continuously or on a daily basis. We know that if a sum of money A is invested for n years @ r % per annum, it will become $A(1+r)^n$ at the end of the period. If compounded m times per annum, the amount will become $A(1+r/m)^{mn}$. Thus, ₹ 100 @ 10% per annum becomes ₹110 and if compounded daily or 365 times in a year (m), the terminal value is ₹ 110.52.

Continuous compounding means that m tends to infinity, and mathematically the terminal value for continuous compounding is given by Ae^{r^n} , where e is the mathematical constant 2.71828. For $A = 100$, $r = 0.1$ and $n = 1$, the terminal value is $100e^{0.1}$ which is 110.52, the same (up to 2 decimals) as worked out by daily compounding. We can use the formula Ae^{r^n} , instead of the formula for daily compounding, to compute the terminal value of a sum of money continuously compounded @ r % for n years. By implication, the formula for discounting continuously is Ae^{-r^n}

From the foregoing, we obtain –

$Ae^{r^n} = A(1+r_m/m)^{mn}$ where r is the continuously compounded rate and r_m the equivalent rate of interest with compounding m times per annum.

or $e^r = (1 + r_m/m)^m$ (deleting power of n from both sides)

Hence, $r = m \log (1 + r_m / m)$, and

$$r_m = m (e^{r/m} - 1)$$

These equations can be used to convert a rate where the compounding frequency is m times per annum to a continuously compounded rate and vice-versa.

The risk free interest rate in futures market often referred to hereafter, is also known as the **repo rate**. A repo or repurchase agreement, is an agreement where the owner of securities agrees to sell them to another party and buy them back at a slightly higher price later. The difference in price is the interest earned by the other party. The repo involves very little risk to either party, because if the borrower (seller) does not keep his promise to repurchase, the lender can retain the securities. Likewise, the borrower does not have to really part with securities to raise funds, and can repossess the securities under the agreement.

1. Forward Contract on No-Income Securities

The forward price for a no-income security like non-dividend paying stocks or discount bonds is the terminal value of present price of the asset after a certain time interval (maturity period of contract) at risk-free rate of interest compounded continuously. This is given by Ae^{r^n} as seen in preceding paragraph.

Hence,

$$F = S e^{r(T-t)} \quad (1)$$

where, F is the forward price of security

S the price of the underlying asset in the contract

r the risk-free rate of interest

T time when the forward contract matures (in years)

t current time (in years)

It is easy to see that when forward price F is equal to terminal value of spot price S (the right hand side in Eq. 1), there is no **arbitrage opportunity**.

However, if forward price $F > S e^{r(T-t)}$ an investor can borrow S rupees for a time $T - t$ at risk-free interest rate r , buy the asset and take a short position in the forward contract. At time T , the asset is sold and the moneys used to repay the loan and yield a profit of $F - S e^{r(T-t)}$. Thus, the value of long forward contract f is $F - S e^{r(T-t)}$.

Suppose F is less than $S e^{r(T-t)}$, then the investor can take a long position and short the asset. The sale yields a cash inflow of S that can be invested at a rate r for a period $T - t$. At time T , the asset is bought under the forward contract, and a profit of $[S e^{r(T-t)} - F]$ is realized, which is the value of the forward contract.

Now, consider the following two portfolios,

Portfolio A: one long forward contract on the security plus an amount of cash equal to $K e^{-r(T-t)}$, where K is the delivery price

Portfolio B: one unit of security

In portfolio A, the cash, invested at rate r , will grow to an amount K , at time $T - (K e^{-r(T-t)} \times e^{r(T-t)})$ i. e. $K \times 1/e^{-r(T-t)} \times e^{r(T-t)} = K$. It can be used to pay for the security at the maturity of the forward contract. Both portfolios will thus have one unit of security at time T . If the value of forward contract is f , then it follows that -

$f + K e^{-r(T-t)} = S$ (forward contract + cash = one unit of security) Hence,

Hence, $f = S - K e^{-r(T-t)}$ (2)

At time t when the forward contract is made, the forward price F and delivery price are the same. The value of contract f is therefore zero. Substituting K by F and taking f as zero in Eq. 2 gives,

$F = S e^{r(T-t)}$ which is the same as Eq. 1

2. Forward Contract on Income Bearing Security

Examples of securities that provide predictable cash income are stocks paying known dividends and coupon interest bearing bonds. If I is the present value at risk free rate r , of income to be received during the life of the contract, then from Eq. 1 above,

$F = (S - I) e^{r(T-t)}$ (3)

Also, if $F > (S - I) e^{r(T-t)}$, then $f = F - (S - I) e^{r(T-t)}$ (4)

And if $F < (S - I) e^{r(T-t)}$, then $f = (S - I) e^{r(T-t)} - F$

The same arguments as in preceding paragraph (Eq. 2) help to arrive at the equation for f vide Eq. 4 above. The portfolio B in this case consists of one unit of security plus cash amount ' I ' (present value of cash flows) borrowed at the risk free rate.

3. Forward Contracts on Security with Known Dividend Yield

A known dividend yield means that the income can be expressed as a percentage of the value of security S . Hence, we can substitute the present value of cash flows I in Eq. 4.3 with an annual rate q . In portfolio B, we will have $S x e^{-q(T-t)}$ units of security, so that when all the income is reinvested at



$q\%$, we get one unit of security at time T . Equation 4.3 is modified as:

$$F = S e^{(r-q)(T-t)} \text{ and}$$

$$f = S e^{(r-q)(T-t)} - K e^{-r(T-t)}$$

If dividend yield varies during the life of the contract, then q is taken as the average dividend yield.

4. General Result

The value of a forward contract at the time it is first entered into is zero. Later, it may have a positive or negative value. A general equation applicable to all forward contracts, that gives the value of a long forward contract 'f', in terms of originally negotiated price K and the current forward price F is -

$$f = (F - K) e^{-r(T-t)}$$

5. Futures on Commodities

On the basis of findings of empirical studies, the equations for forward price in relation to spot price developed in the foregoing are deemed to apply for futures prices as well.

i) Investment Assets

Here one has to make a distinction between commodities that are held by a significant number of investors solely as investment assets, like gold and silver, and other commodities that are primarily held for consumption. A person plots his put our savings in real estate, or gold and silver in anticipation of appreciation in value with passage of time, though the asset does not yield any income while it is held. Investment assets are hence like no-income securities if storage cost is zero, and the forward or futures price is given by Eq. 1

$$F = S e^{r(T-t)}$$

In practice, there is indeed a storage cost, and the spot price of security S can be considered as $S + U$, where U represents the present value of storage cost. The equation for F stands modified to

$$F = (S + U) e^{r(T-t)}$$

or $F = S e^{(r+u)(T-t)}$ when U is expressed as a percentage of spot price S .

ii) Consumption Assets

For commodities that are held for consumption purposes such as agricultural commodities or base metals, which are used as raw materials by processors and manufacturers, the arbitrage arguments leading to Eq. 4.1 do not apply when the futures price is less than the spot price.

First, consider the case when $F > (S + U) e^{r(T-t)}$. An arbitrageur, in this situation, would borrow an amount of $S + U$ at rate $r\%$ to purchase one unit of commodity and pay storage cost, and sell a futures contract on one unit of commodity. At time T , it would yield a profit of $F - (S + U) e^{r(T-t)}$. It is known, though, that the situation cannot hold for a long time because the arbitrage opportunity leads to an increase in spot price S (due to buying) and progressive decrease in F (due to selling of contracts).

Now consider that $F < (S + U) e^{r(T-t)}$

An arbitrageur, in this case, should sell the commodity now in such a way that he realizes the amount $S + U$, which implies that he is paid for the storage cost. This is usually not possible. In case of investment assets, like gold or silver, an arbitrageur can sell the commodity, save on storage costs, and invest the money at rate $r\%$; and buy the contract at time T with the money, making a profit from the inequality. But in case of consumption commodities, individuals and companies do not hold inventory as an investment but for future consumption purposes. They are reluctant to sell the commodity and buy futures contract because futures contract is no substitute for commodity

for the purposes of production of goods. Theoretically, therefore, the inequality $F < (S + U) e^{r(T-t)}$ will hold for a long time. For S to go down an additional supply is required and if that does not happen because holders do not shed inventory or sellers restrict supply to the spot market due to low prices, the inequality remains. The benefit to the users of the commodity by holding the inventory in such a situation arise from the ability to keep production running or to profit from temporary local shortages. The benefit is referred to as convenience yield, which may be deemed a substitute for profit. Hence, the inequality 8 may be modified as –

$$F e^{y(T-t)} (S + U) e^{r(T-t)}$$

where y is the convenience yield as a percentage of spot price S . If U is also expressed as a percentage, then

$$F e^{y(T-t)} = S e^{(r+u)(T-t)}$$

or

$$F = S e^{(r+u-y)(T-t)} \quad (9)$$

If 'F' the futures price decreases as the maturity of contract increases, it can be inferred from Eq. 4.9 that convenience yield 'y' is greater than 'r + u'. The greater the possibility that shortages will occur during the life of the contract, the higher is the convenience yield. If users hold high inventories, there is little chance of shortages in the near future, and convenience yield is low. On the other hand, low inventories tend to lead to high convenience yields. When the futures price is less than the spot price, the position is called '**backwardation**'.

6. The Cost of Carry

The futures price is related to the spot price by the cost of carry, which is the storage cost plus the interest cost 'r' on the money locked in the asset (interest paid on loan) less the income (dividend) earned on the asset. For no-income stock, the cost of carry is r because there are no storage costs and no income is earned; for a stock index, it is $r - q$ since income is earned @ $q\%$; it is $r - r_f$ for a currency (r_f is risk free foreign interest rate); for a commodity, it is $r + u$, where u is the storage cost as a percentage of S .

For an **investment asset**, the futures price is $F = S e^{c(T-t)}$, substituting c for r in Eq. 1, where c is the cost of carry as a percentage of S .

For a **consumption asset**, the futures price is $F = S e^{(c-y)(T-t)}$, where y is the convenience yield.

When the futures price is higher than the spot price, the market is said to be '**contango**', which means that futures prices are determined only by the cost of carry. The difference between two futures prices is referred as the 'spread'. It is called 'intra-commodity spread' when the difference is between futures prices for the same commodity for two different maturities. It is called 'inter-commodity spread' when the difference relates to futures prices of two different commodities like wheat and soya bean. It is 'inter-market spread', when the difference is between futures prices in two different markets.

7. Futures Price and Expected Future Spot Price

We have derived the formulae for determining the futures price for different types of assets (no-income assets, income bearing assets and known income or dividend yielding assets). The futures price of investment assets and consumption assets in the context of these formulae have also been examined. It is now time to address the question whether futures price is equal to the expected future spot price. Keynes and Hick advanced a theory that if hedgers tend to hold short positions and speculators tend to hold long positions, the futures price will be less than the expected spot price. It is argued that speculators need to be rewarded for the risks they bear. If hedgers are long and speculators short in future, the futures price will be higher than the future spot price; once again for the same reason that speculators need to be compensated.



Risk in Futures Position

Consider the case of a speculator who takes a long position in the hope that the future spot price of the asset will be higher than the futures price at maturity. It could be viewed as if the speculator invests the present value of the futures price into a risk free investment at time t while simultaneously taking a long futures position. The proceeds of the investment are used to buy the asset on maturity and it is sold in the market immediately at the market price (future spot price). The cash flows to the speculator are:

Time t : $-F e^{-r(T-t)}$ (negative sign indicates cash outflow)

Time T : $+S$ (future spot price)

The present value of the investment is

$$F e^{-r(T-t)} + S_e e^{-k(T-t)} \quad (10)$$

where, S_e is the expected future spot value

' k ' the discount rate, i.e. the rate of return required by the investor.

Theoretically, the futures price converges to the spot price at maturity of the contract because if it were higher, an arbitrageur would sell the futures contract during delivery period, buy the asset at spot price and make delivery. Arbitrage would lead to fall in futures price until it equals the spot price.

Thus, theoretically, the investment opportunities in securities market have zero net present value. Hence, the present value of the long position taken by speculator given by Eq. 10 above is zero:

$$F e^{-r(T-t)} + S_e e^{-k(T-t)} = 0$$

or

$$F = S_e e^{(r-k)(T-t)} \quad (11)$$

The required rate of return k depends on the market risk or systematic risk of the investment. Systematic risk arises from a correlation between returns from the investment and returns from the stock market as a whole. It is seen from Eq. 11 that if $k = r$, $F = S_e$. The systematic risk in futures market is generally higher than the stock market because of high leverage. An investor has to invest only 10% to 15% of the contract value as margin to trade in futures market. In other words, $k > r$ and therefore $F < S_e$.

By implication, the futures price should generally move upwards as the maturity of contract approaches (by the theory of convergence) to equal S_e and a trader should over a long period of time make profits by consistently holding long futures positions.

Empirical studies on the behaviour of futures prices have led to results, which neither support the hypothesis represented by Eq.11 nor negate it.

8. Option Contracts

Option contracts are an alternative to futures contracts for dealing with the risk due to adverse price movements. There are two types of options: call, and put, and the pay-off from each, for the holder and the seller have also been examined. Also, that the market value of an option is the sum of its intrinsic value and the time value. The minimum value of an option is zero; it cannot be negative. A call option with a strike price of ₹ 100 becomes worthless if the asset price declines to ₹ 80, because the holder will simply not exercise the option. Hence, the intrinsic value of the option, i.e. (Spot price - strike price) - ₹ 80 - ₹ 100 = 0. In fact, the actual value may be positive, although the intrinsic value is zero, because of the time value if there is a long time for the expiry of contract and the chance that the asset price may go up before expiry date.

(i) Valuation of Option Contract

The time value of an option depends on the time to expiry and the price volatility while the intrinsic value depends on risk free interest rate and once again, the time to expiry. The market value of an option (on non-dividend paying share) is therefore a function of its current price, strike price, risk free interest rate, time to expiry and price volatility. These five variables form the basis of a model developed by two American researchers, **Black** and **Scholes**, for **pricing of a European call option**. It is a model that is generally used for option valuation and though not perfect, the model gives results that are in agreement with those based on empirical research.

(ii) Black-Scholes Option Valuation Model

The model Black-Scholes Option Valuation is as follows:

$$C = S \cdot N(d_1) - X \cdot e^{-RT} \cdot N(d_2) \quad (12)$$

where,

C is the value of call option

S is the current market price of shares in question X is the future exercise price

R is the risk free interest rate per annum

T is the time to expiry (in years)

e is the mathematical constant 2.718, used to calculate value on a continuous compounding basis. ($X e^{RT}$ is the future value or amount, at time T, of a sum of money X invested @ R % on continuous compounding basis. If compounded annually, the amount at R % compound rate of interest at time T is $X(1 + r/100)^T$, which is roughly equal to $X e^{RT}$)

$N(d_1)$ and $N(d_2)$ represent the cumulative area under the normal distribution curve for a 'z' value of d_1 and d_2 where

$$d_1 = \frac{\log(s/x) + RT}{v \cdot \sqrt{T}} + .v \cdot \sqrt{T}$$

$$d_2 = d_1 - v \cdot \sqrt{T}$$

and log (SIX) is the natural log (to the base 'e') of SIX.

*'z' the standard normal variable (observation value) in a normal distribution with a mean (μ) = 0, and a standard deviation $\sigma = 1$. The value of z is given by

$$z = \frac{X - \mu}{\sigma} \quad (A)$$

where x is variable, which can take any value in a normal distribution.

The value of z reflects the deviation from the mean (vertical line drawn at the mean value 0 and hence, determines the area under the curve between - z and + z. Suppose, a normal distribution has a mean (μ) of 10 and a standard deviation σ of 5. If we want to know the probability of x having a value between 0.2 and 19.8, we shall find z for $x = 0.2$ and $x = 19.8$ by using the formula (A). The value of z works out as - 1.96 and + 1.96, and for $z = 1.96$, the area under the normal curve is a 0.95 from the tables. There is thus 95% probability that x will have a value between 0.2 and 19.8.

Let us apply the Black-Scholes model to an example for the sake of clarity. We have to calculate the value of a call option on shares of an ABC Company based on the following information:

Current share price - S = ₹ 165

Exercise price - X = ₹ 150

Risk free interest rate - R = 6%



Time to option's expiry - $T = 2$ years

Volatility (standard deviation) of share price - $v = 15\%$

$$\begin{aligned} \text{Hence, } d_1 &= \frac{1}{2} \cdot v \cdot \sqrt{T} \\ &= \{\log(165-150) + 0.06 \times 2\} / (0.15 \times \sqrt{2}) + 1/2 \times 0.15 \times \sqrt{2} \\ &= +1.12 \text{ app.} \\ d_2 &= d_1 - v \cdot \sqrt{T} \\ &= 1.12 - 0.15 \times \sqrt{2} = 0.91 \text{ app.} \end{aligned}$$

d_1 and d_2 represent z values, and the area under the normal curve for d_1 and d_2 from the table is + 0.3686 and + 0.3186, respectively. Hence, $N_{(d_1)}$ and $N_{(d_2)}$, the cumulative probabilities are: $N_{(d_1)} = 0.50 + 0.3686 = 0.8686$

$$N(d_2) = 0.50 + 0.3186 = 0.8186$$

$$\begin{aligned} \text{Hence, the option value } C &= S \cdot N(d_1) - X \cdot e^{-RT} N(d_2) \\ &= (165 \times 0.8686) - 150 \times e^{-(0.06 \times 2)} \times 0.8186 \\ &= 34.42 \end{aligned}$$

Thus, the option value is ₹ 34.42, which is substantially higher than the intrinsic value ₹ 15, on account of the considerable length of time to expiry (2 years).

(iii) Put - Call Parity Theorem

The Black - Scholes model gives the value of a European call option. The **value of a put option** is calculated on the basis of put-call parity theorem. There are four fundamental securities: shares, risk-free bonds, call options in shares and put option in shares. The increase or decrease in share price, increases or decreases the investor's wealth. Risk free bonds typically offer a capital gain in value instead of interest. If B is the par value of the bond, which is the redemption value after time t (years), then its current value is $B \times (1 + R)^{-t}$ which is the discounted value of B at risk free rate. The value of a call option, for a buyer, increases if the share price increases, while the loss is limited to the option premium. For a seller of call option, the maximum gain is the option premium received for writing the option, and the loss increases with increase in share price. A put option is opposite of call option. The buyer of put option gains if the share price falls while the seller of put gains if share price rises.

Now, consider that you have bought the shares (S) and also bought a put option (P) in shares. If the share price rises, the purchase of shares results in a gain, while the put option becomes worthless. The net result is a gain less the option premium. If the share price falls, the put option yields gain but you lose equally from the purchase of shares. The net result is zero as one cancels the other. Thus, the buying of shares and **a put option places you in a position where an increase in share price begets a gain (less premium) while a decrease in share price causes a loss equal to option price.**

If you were to buy a bond (B) and a call option (C), then a rise in share price would fetch a gain on call option, while the value of bond remains unchanged due to movement in share price. Should the share price fall, your loss will be the option premium, while bond value remains unaffected. Thus, the net result from buying of a bond and a call, is that **a rise in share price yields a gain (less option premium), and a fall in share price means a loss to the extent of option premium.**

It is quite clear from the foregoing paragraphs, that the buying of a share and a put option has an identical outcome compared to buying a bond and a call option (at the same exercise price and expiry date as the put). This relationship is summarized as $S + P = B + C$ and termed as the Put-Call parity theorem and gives a fixed relationship between the premiums of European put and call options. Hence, $S + P - C = B$, which means that the value of a portfolio $S + P - C$ is equal to the present discounted value, at risk free rate of interest, of a bond of face value B.

Consider the case where the current share value is ₹ 100, and the exercise price for both the call and put options, also is ₹100 (at the money), 'r' be 6% and the time to maturity 2 years. Let us assume that in 2 years, the share price increases to ₹ 140. Thus, $S + P - C$ or buying a share and put and selling a call, (- C represents sale while + C is for buy) will be:

S - the share value	₹ 140
P - the value of put option	0 (value is zero as put is not exercised)
C - the value of call option	40 (loss on call option sold)

Hence, the value of portfolio $(S + P - C) = 140 + 0 - 40 = ₹100$, which is the exercise price (X). Algebraically, $S + P - C = S + 0 - (S - X)$

or $S + P - C = +X$

Had the share price fallen, the same value would be obtained:

$$S + P - C = S + (X - S) - 0$$

$$S + P - C = +X$$

As the value of a European option is obtained at the expiry date, the present value of the option is $X(1 + R)^{-T}$

or $X \cdot e^{-RT}$ if we use daily compounding

It may be noted that it is the present value of an investment at risk free rate of interest 'R' or the value of a risk free bond 'B'. Hence, the put-call parity equation is -

$$S - X \cdot e^{-RT} = C - P$$

or $P = C + X \cdot e^{-RT} - S$ (13)

That is to say, the value of a put is equal to the value of the call, plus the present value of the exercise price, less the current share price.

9. Binomial Tree

A binomial tree is a useful and popular technique for pricing of options. It involves constructing of a binomial tree, which represents the two possible values of the asset price over the life of the option (Figure 4.1). For example, the current price of non-dividend paying stock is ₹ 20 and it is known that in 3 months, the price will be either ₹ 22 or ₹ 18. Let us say, we have to find the value of a **European call option** on the stock at an exercise price of ₹ 21 in 3 months. If the stock price becomes ₹ 22, the value of the option is ₹ 1; if it becomes ₹ 18, the value of the option will be zero. The position is illustrated below:

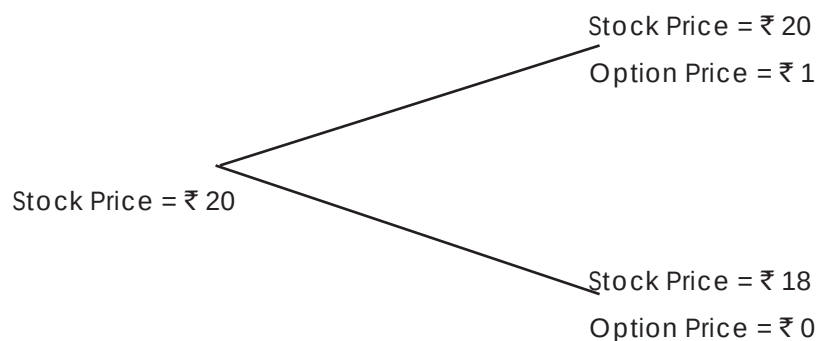


Fig. The Binomial Tree

Suppose a portfolio of the stock and the option on the stock is created in a way that there is no uncertainty about its value at the end of 3 months. As the portfolio carries no risk, it should earn a risk free return. Consider a portfolio consisting of a long position in shares of the stock and a short position in one call option. If the price of stock rises to ₹ 22, the value of the shares is 22' and the value of option is ₹ 1; if the share price becomes ₹ 18, the value of shares is 18' and the value of option is zero. For a risk free portfolio,

$$22\delta - 1 = 18\delta, \text{ or } \delta = 0.25$$

Thus, a risk free portfolio is as follows: buy 0.25 shares and sell one call option. If share price goes up to ₹ 22, the value is $22 \times 0.25 - 1 = 4.5$. If price is ₹ 18, the value is $18 \times 0.25 = 4.5$

Regardless of whether the share price moves up or down, the value of option is always 4.5 at the end of 3 months. If the risk free rate of interest is 12%, the value of the portfolio today must be the present value of ₹ 4.5, i.e

$$4.5 e^{-0.12 \times 0.25} = 4.367 \quad (\text{X})$$

The current stock price is ₹ 20 and if f denotes the option price, the value of portfolio today will be $20 \times 0.25 - f$

$$\text{or} \quad 5 - f$$

It follows that, $5 - f = 4.367$ (Y)

Hence, $f = 0.633$. In other words, in the absence of arbitrage opportunities, the value of the option must be 0.633. It is seen from Y above, that if the option value is more than 0.633, the RHS will become less than 4.367, meaning thereby that it would cost less than 4.367 to set up the portfolio and earn more than the risk free rate. If f is less than 0.633, it means that RHS is more than 4.367; a quick look at X shows that it implies that selling the portfolio would amount to borrowing money at less than the risk free rate of 12%.

The aforesaid example can be generalized and expressed as:

$$Sxux\delta - f_u = Sxdx\delta - f_d \quad (\text{Q})$$

Where,

S the current stock price

u a factor > 1 so that $S \times u$ represents the higher level in share price

d a factor < 1 so that $S \times d$ represents the lower level in share price

f_u the pay-off when share price moves up

f_d the pay-off when the share price moves down

δ the number that makes the portfolio risk free

The LHS of equation **Q** represents the value of portfolio when share price goes up and the RHS is the value when the share price goes down. For a risk free portfolio, both are equal as shown by **Q**. Hence, $\delta = f_u - f_d / S_u - S_d$

And, the present value of portfolio is $(S_u \delta - f_u) e^{-RT}$

The cost of setting up the portfolio is $S \delta - f$

It follows that

$$S \delta - f = (S_u \delta - f_u) e^{-RT}$$

Substituting the value of δ , the equation gives the value of f as-

$$f = e^{-RT} (p f_u + (1-p) f_d)$$

Where,

$$p = e^{RT} - d / u - d$$

1. Risk-neutral Valuation

Risk-neutral valuation is another approach to the valuation of options. The variable ' p ' in the above equations may be interpreted as the probability of the share price moving up. Hence, $(1 - p)$ represents the probability of the price going down. The expected pay-off from the option is therefore

$$p f_u + (1 - p) f_d$$

Equation 14, it is clear that it gives the present value of expected future value (payoff) of the option. The expected share price $E(S_T)$ at time T is

$$E(S_T) = p S_u + (1 - p) S_d$$

$$\text{or } E(S_T) = p S (u - d) + S_d$$

Substituting the value of ' p ' from Eq.15 above,

$$E(S_T) = S e^{RT}$$

which means that the share price grows at a risk free rate. In other words, by **p** setting the probability of an increase in share price equal to ' p ', we have fixed the return on the share to risk free rate. This is an **important general principle** relating to valuation of options called the risk-neutral valuation.

We find that no-arbitrage argument and risk-neutral valuation lead to the same result. We assume that it is a risk-neutral world and investors require no compensation for risk and the return on all securities is the risk free interest rate. The procedure discussed here also applies to the valuation of put option. The analysis can be extended to a two-step binomial tree, for example, when the share price rises or falls by 10% in each of the two steps of 3 months duration. Equation 4.14 gets change accordingly.

10. DELTA

The delta of a stock option is the ratio of the change in option price to the change in value of the underlying security. It is an important parameter in pricing and hedging of options and refers to the number of units of stock one should hold for each option sold to create a risk-free hedge. It is the same ' δ ' that we used in **Eq. 9** above to create a risk free portfolio, which is referred as **delta hedging**. The value of delta was 0.25 in the example considered by us in section, 9 above.

11 SUMMARY

The futures price of a contract with a certain delivery date is theoretically the **same as** the forward price for a contract with the same delivery date if the interest rates are predictable, and are close to each other for short-life contracts, when interest rates vary unpredictably.



Futures contracts may be divided into two categories based on whether the underlying asset is held by a significant number of investors for investment, or primarily for consumption purposes. In the case of investment assets, three different situations can be considered:

- The asset provides no income
- The asset provides a known income
- The asset provides a known dividend yield.

The futures price for an asset with no income is the amount its spot price would become if it were invested over the period of contract at a risk free rate of interest, compounded continuously. We have to make appropriate adjustment to calculate the futures price in case of assets, which yield a known income or a known dividend yield. The futures prices for contracts on investment assets like stock indices, currencies, gold and silver, are thus ascertained.

An alternative method to obtain the futures price is based on the concept of 'cost of carry'. It is the storage cost of the underlying asset plus the cost of financing it (interest, insurance, handling and transport) minus the income, if any, from the asset. For an investment asset, the futures price is greater than the spot price by an amount equal to the cost of carry. In case of consumption assets, the futures price is greater than the spot price by an amount of cost of carry net of convenience yield. Thus, the futures price in case of consumption assets is **less** than that for investment assets, other things being equal, by the convenience yield because of the benefits derived from holding the asset in terms of ability to keep the production running or be immune to shortage of commodity during the life of contract. If futures price decreases with increase in maturity of contracts, it means that the convenience yield as a percentage of spot price, is **higher** than the $r + u$, where r is the risk free rate of interest and u the storage cost, both expressed as a percentage of spot price.

Theoretically, there is convergence of the futures price and the spot price on the maturity date of the contract. But in real situations, it is not so and we take recourse to the capital asset pricing model to establish a relationship between futures price and expected future spot price. Thus, if the return (k) from the contract is higher than the stock market, i.e. the risk is higher than the systematic risk, the futures price is lower than the expected future spot price and vice versa.

The market value of an option is a combination of its intrinsic value and its time value. For non-dividend paying shares, the intrinsic value is a function of the strike price, the current share price, the risk free interest rate and the time to expiry. The time (or gamble) value is a function of both the time to expiry and the volatility (or variability) in price of the stock to which the option relates. The market value of the option can be found through the Black-Scholes option valuation model. Though the Black-Scholes model excludes the possibility of dividends on the underlying shares, it can be adapted to allow for the impact of dividends by suitable adjustment in share price for the present value of the expected dividend.

There are four fundamental financial securities: shares, risk free bonds, call options, and put options. These can be combined into an equality relationship: $S + P = B + C$. Hence, a **risk free investment** can be created by the combination: **$S + P - C = B$** . The equality relationship can also be used to develop a fixed relationship between the premium on call option and the premium on put option. It is $S - B = C - P$. The amount by which the share price exceeds the exercise price gives the profit or return on the option at the end of the life of the option and its present value at a risk free interest rate represents the return on risk free bond. Thus, **$X \cdot e^{-RT} = B$** and substituting for B in the equation, we get the **Put-Call parity theorem: $S - X \cdot e^{-RT} = C - P$**

The valuation of options can also be viewed in a simpler way, though with limited perspective, by using a binomial tree model. It is based on the fact that a risk free investment (hedge portfolio) can be created out of shares and options and it can be compared to the return of a bond (risk free return) to find the value of the option.

3.15.7 Hedging with Commodity Futures:

Hedging strategy with futures revolves around compensating anticipated losses in the spot market with the equivalent gains in the futures market. This is done by taking a position on the futures market that is opposite to the position in the spot market.

Long and Short Positions

When a party holds the underlying asset he is said to be long on the spot market. For example, a jeweller holding gold or silver is long on the underlying asset. A wheat farmer is long on wheat when he sows the crop.

Similarly, a party that requires the underlying asset in future is said to be short on the underlying. For example, a tea exporter who needs stock of tea to execute the pending orders, is short on tea, the underlying commodity/asset. A wheat flour mill needing wheat in future is short on wheat.

Similarly, in the futures market if one buys a futures contract he is said to be long and the one who sells the futures contract is said to be short.

To execute a hedge the following steps are taken.

1. One who is long on the asset, goes short on the futures market, and the one who is short on underlying, goes long in the futures market.
2. At an appropriate time one can neutralize the position in the futures market, i.e. go long on futures if one was originally short and go short on futures if one was originally long, and receive/pay the difference of prices.
3. Sell or buy the underlying asset in the physical market at prevailing price.

Short Hedge

A short hedge means a short position in futures. It is used by those who are long on the underlying asset. In order to hedge the long position on asset one would require taking short position in the futures market.

For example, consider a sugar mill in Uttar Pradesh. It is expected to produce 100 MT of sugar in the month of April. The current price today (the month of February) is ₹ 22 per kg. April futures contract in sugar due on 20th April is trading at ₹ 25 per kg. The sugar mill apprehends that the price lesser than ₹ 25 per kg will prevail in April due to excessive supply then. How can the sugar mill hedge its position against the anticipated decline in sugar prices in April?

To execute the hedging strategy the sugar mill has to take the opposite position in the futures market. The sugar mill is long on the asset in April. Therefore, it needs to sell the futures contract today. The number of contracts that needs to be sold is dependent upon the exposure in the physical asset and the value one needs to cover. Assuming that 100% cover is desired we can find the number of contracts to be sold. Assuming each contract for sugar is for 10 MT the number of contracts to be sold is 10.

No. of contracts to be sold

= Quantity to be hedged/quantity in each futures contract

= 100 MT/10 MT = 10

The sugar mill would go short on futures in February. Prior to April, before the future contract expires, the sugar mill buys the future contract to nullify its position in the futures market. The underlying asset, i.e. sugar is sold in the spot market. The price realized by the sugar mill in two different scenarios of decline or rise in sugar prices, using the principle of convergence of price on the due date of the contract, is worked out as follows.



When the price falls to ₹ 22 per kg.

Cash flow (₹ per kg)

In the futures market		
	Sold futures contract in February	+ 25.00
	Bought futures contract in April	- 22.00
	Gain in the futures market	+ 3.00
	Price realized in the spot market	+ 22.00
	Effective price realized	₹ 25.00 per kg

Here the loss of ₹ 3 (₹ 25 - ₹ 22) in the spot market is made up by an equal gain in the futures market.

When the price rises to ₹ 26 per kg

In the futures market		
	Sold futures contract in February	+ 25.00
	Bought futures contract in April	- 26.00
	Loss in the futures market	- 1.00
	Price realized in the spot market	+ 26.00
	Effective price realized	₹ 25.00 per kg

Here the gain of ₹ 1 (₹ 26 - ₹ 25) in the spot market is offset by the equal loss in the futures market.

Due to the fact that prices of sugar in the spot market and futures market must converge a fixed price of ₹ 25 per kg is realized by the sugar mill. The loss or gain in the spot market is fully compensated by gain/loss in the futures market.

Long Hedge

A long hedge is one that requires taking a long position in the futures. It is used by those who are short on the asset.

For example, consider a petrochemical plant that needs to process 10,000 barrels of oil in three months time. To hedge against the rising price the plant needs to go long on the futures contract of crude oil. The spot price of crude oil is ₹ 1,950 per barrel, while futures contract expiring three months from now is selling for ₹ 2,200 per barrel. By going long on the futures the petrochemical plant can lock-in the procurement at ₹ 2,200 per barrel. Assuming the size of one futures contract of 100 barrels, the firm buys 100 futures to cover its exposure of 10,000 barrels.

Let us examine the price that would be payable under two scenarios of rise in price to ₹ 2,400 or fall in price to ₹ 1,800 per barrel after three months.

Figures [in ₹/barrel]

Price after 3 months	₹ 1,800/barrel	₹ 2,400/barrel
Actual purchase price	1,800	2,400
Gain/loss on futures		
Bought futures at	2,200	2,200

Sold futures at	1,800	2,400
Profit/loss on futures	-400	+ 200
Effective Price (Rs/barrel)	2,200	2,200

Here again we observe that the loss in the physical position is offset by the gain in the futures position and vice versa. This results in effective price equal to the price of futures at the time of setting up the hedge.

Example 3.3 Long Hedge

Today is 24th March. A refinery needs 1,050 barrels of crude oil in the month of September. The current price of crude oil is ₹ 3,000 per barrel. September futures contract at Multi Commodity Exchange (MCX) is trading at ₹ 3,200. The firm expects the price to go up further and beyond ₹ 3,200 in September. It has the option of buying the stock now. Alternatively it can hedge through futures contract.

- If the cost of capital, insurance, and storage is 15% per annum, examine if it is beneficial for the firm to buy now?
- Instead, if the upper limit to buying price is ₹ 3,200 what strategy can the firm adopt?
- If the firm decides to hedge through futures, find out the effective price it would pay for crude oil if at the time of lifting the hedge (i) the spot and futures price are ₹ 2,900 and ₹ 2,910 respectively, (ii) the spot and futures price are ₹ 3,300 and ₹ 3,315 respectively.

Solution

- If cost of carry (including interest, insurance, and storage) is 15%, the fair price of the futures contract is $s_0 \times e^{-rt} = 3,000 \times e^{-6/12 \times 0.15} = ₹ 3,233.65$.

It implies that the the firm buys crude oil today to be used after six months it would effectively cost ₹ 3,233.65 per barrel.

- Since futures are trading at ₹ 3,200 it can lock-in the price of around ₹ 3,200 through a long hedge. Under long hedge the firm would buy the futures on crude oil today and sell it six months later while simultaneously meeting the physical requirements from the market at the price prevailing at that time. Irrespective of price six months later, the firm would end up paying a price of around ₹ 3,200.
- If the firm adopts the strategy as mentioned in (b), the effective price to be paid by the firm in cases of rise and fall in spot values is shown below:-

Quantity of crude oil to be hedged	=1,075 barrels
Size of one futures contract	= 100 barrels
No. of futures contracts bought 1,075/100	= 11 contracts (Rounded)
Futures price	= ₹ 3,200
Exposure in futures 3,200 x 11 x 100	= ₹ 35,20,000

Six months later the firm would unwind its futures position and buy the requirement from the spot market.

	₹	₹
Futures sold at price	2910	3315
Amount of futures sold	32,01,000	36,46,500
Gain/Loss on futures (11 contracts)	(3,19,000)	1,26,500



Spot Price	2,900	3,300
Actual Cost of buying(1075 barrels)	31,17,500	35,47,500
Effective cost of buying	34,36,500	34,21,000
Effective Price	3,197	3,182

3.15.8 Participants in commodity Futures

- Farmers/ Producers
- Merchandisers/ Traders
- Importers
- Exporters
- Consumers/ Industry
- Commodity Financers
- Agriculture credit Providing agencies
- Corporate having price risk exposure in commodities

3.15.9 Benefits of Futures Trading

- **Price discovery for commodity players**
 - A farmer can plan his crop by looking at prices prevailing in the futures market
- **Hedging against price risk**
 - A farmers can sell in futures to ensure remunerative prices
 - A processor/ manufacturing firm can buy in futures to hedge against volatile raw material costs
 - An exporter can commit to a price to his foreign clients
 - A stockiest can hedge his carrying risk to ensure smooth prices of the seasonal commodities round the year
- **Easy availability of finance**

Based on hedged positions commodity market players (farmers, processors, manufacturers, exporters) may get easy financing from the banks.

3.15.10 How Commodity Futures Help

a) Risk Management

- (i) **Growers** – Short hedge on upcoming produce
- (ii) **Traders** – short Hedge on Stored quantity
- (iii) **Manufacturers** – Long Hedge on input cost, short hedge on finished products

Any price risk that is not managed is a cost; any cost is a direct dent on profitability.

b) Price Discovery

Futures prices can be used as indicative prices for negotiating the export prices and also upcountry sales.

3.15.11 Profitability Areas in Futures Market

Action	Impact
Cover raw material price risk	Certainty in input cost. Certainty in cost of production
Cover the export commitment	Certainty about profits. Certainty in income
Cover input requirements through futures market	Less financing requirements; reduced interest cost. Reduces cost of production. Increase in profits
Buy in futures market	Save on strong and storage management costs. Increase in profitability

3.16 COMMONLY USED TERMS IN COMMODITY MARKET

Accruals: - Commodities on hand ready for shipment, storage and manufacture

Arbitragers: - Arbitragers are interested in making purchase and sale in different markets at the same time to profit from price discrepancy between the two markets.

At the Market: - An order to buy or sell at the best price possible at the time an order reaches the trading pit.

Basis: - Basis is the difference between the cash price of an asset and futures price of the underlying asset. Basis can be negative or positive depending on the prices prevailing in the cash and futures.

Basis grade: - Specific grade or grades named in the exchanges future contract. The other grades deliverable are subject to price of underlying futures

Baskets:- Basket options are options on portfolios of underlying assets. The underlying asset is usually a weighted average of a basket of assets. Equity index options are a form of basket options.

Bear: - A person who expects prices to go lower.

Bid:- A bid subject to immediate acceptance made on the floor of exchange to buy a definite number of futures contracts at a specific price.

Breaking:- A quick decline in price.

Bulging: - A quick increase in price.

Bull:- A person who expects prices to go higher.

Buy on Close: - To buy at the end of trading session at the price within the closing range.

Buy on opening: - To buy at the beginning of trading session at a price within the opening range.

Call: - An option that gives the buyer the right to a long position in the underlying futures at a specific price, the call writer (seller) may be assigned a short position in the underlying futures if the buyer exercises the call.

Cash commodity: - The actual physical product on which a futures contract is based. This product can include agricultural commodities, financial instruments and the cash equivalent of index futures.

Close: - The period at the end of trading session officially designated by exchange during which all transactions are considered made "at the close".



Closing price: - The price (or price range) recorded during the period designated by the exchange as the official close.

Commission house: - A concern that buys and sells actual commodities or futures contract for the accounts of customers.

Consumption Commodity: - Consumption commodities are held mainly for consumption purpose. E.g. Oil, steel

Cover: - The cancellation of the short position in any futures contract buys the purchase of an equal quantity of the same futures contract

Cross hedge: - When a cash commodity is hedged by using futures contract of other commodity.

Day orders: - Orders at a limited price which are understood to be good for the day unless expressly designated as an open order or "good till canceled" order.

Delivery: - The tender and receipt of actual commodity, or in case of agriculture commodities, warehouse receipts covering such commodity, in settlement of futures contract. Some contracts settle in cash (cash delivery). In which case open positions are marked to market on last day of contract based on cash market close.

Delivery month: - Specified month within which delivery may be made under the terms of futures contract.

Delivery notice: - A notice for a clearing member's intention to deliver a stated quantity of commodity in settlement of a short futures position.

Derivatives: - These are financial contracts, which derive their value from an underlying asset. (Underlying assets can be equity, commodity, foreign exchange, interest rates, real estate or any other asset.) Four types of derivatives are trades forward, futures, options and swaps. Derivatives can be traded either in an exchange or over the counter.

Differentials: - The premium paid for grades better than the basis grade and the discounts allowed for the grades. These differentials are fixed by the contract terms on most exchanges.

Exchange: - Central market place for buyers and sellers. Standardized contracts ensure that the prices mean the same to everyone in the market. The prices in an exchange are determined in the form of a continuous auction by members who are acting on behalf of their clients, companies or themselves.

Forward contract: - It is an agreement between two parties to buy or sell an asset at a future date for price agreed upon while signing agreement. Forward contract is not traded on an exchange. This is oldest form of derivative contract. It is traded in OTC Market. Not on an exchange. Size of forward contract is customized as per the terms of agreement between buyer and seller. The contract price of forward contract is not transparent, as it is not publicly disclosed. Here valuation of open position is not calculated on a daily basis and there is no requirement of MTM. Liquidity is the measure of frequency of trades that occur in a particular commodity forward contract is less liquid due to its customized nature. In forward contracts, counter- party risk is high due to customized & bilateral nature of the transaction.

Forward contract is not regulated by any exchange. Forward contract is generally settled by physical delivery. In this case delivery is carried out at delivery center specified in the customized bilateral agreement.

Futures Contract: - It is an agreement between two parties to buy or sell a specified and standardized quantity and quality of an asset at certain time in the future at price agreed upon at the time of entering in to contract on the futures exchange. It is entered on centralized trading platform of exchange. It

is standardized in terms of quantity as specified by exchange. Contract price of futures contract is transparent as it is available on centralized trading screen of the exchange. Here valuation of Mark-to-Mark position is calculated as per the official closing price on daily basis and MTM margin requirement exists. Futures contract is more liquid as it is traded on the exchange. In futures contracts the clearing-house becomes the counter party to each transaction, which is called novation. Therefore, counter party risk is almost eliminated. A regulatory authority and the exchange regulate futures contract. Futures contract is generally cash settled but option of physical settlement is available. Delivery tendered in case of futures contract should be of standard quantity and quality as specified by the exchange.

Futures commission merchant: - A broker who is permitted to accept the orders to buy and sale futures contracts for the consumers.

Futures Funds: - Usually limited partnerships for investors who prefer to participate in the futures market by buying shares in a fund managed by professional traders or commodity trading advisors.

Futures Market: - It facilitates buying and selling of standardized contractual agreements (for future delivery) of underlying asset as the specific commodity and not the physical commodity itself.

The formulation of futures contract is very specific regarding the quality of the commodity, the quantity to be delivered and date for delivery. However it does not involve immediate transfer of ownership of commodity, unless resulting in delivery. Thus, in futures markets, commodities can be bought or sold irrespective of whether one has possession of the underlying commodity or not. The futures market trade in futures contracts primarily for the purpose of risk management that is hedging on commodity stocks or forward buyers and sellers. Most of these contracts are squared off before maturity and rarely end in deliveries.

Hedging:- Means taking a position in futures market that is opposite to position in the physical market with the objective of reducing or limiting risk associated with price.

In the money:- In call options when strike price is below the price of underlying futures. In put options, when the strike price is above the underlying futures. In-the-money options are the most expensive options because the premium includes intrinsic value.

Index Futures: - Futures contracts based on indexes such as the S & P 500 or Value Line Index. These are the cash settlement contracts.

Investment Commodities: - An investment commodity is generally held for investment purpose. e.g. Gold, Silver

Limit: - The maximum daily price change above or below the price close in a specific futures market. Trading limits may be changed during periods of unusually high market activity.

Limit order:- An order given to a broker by a customer who has some restrictions upon its execution, such as price or time.

Liquidation: - A transaction made in reducing or closing out a long or short position, but more often used by the trade to mean a reduction or closing out of long position.

Local: - Independent trader who trades his/her own money on the floor of the exchanges. Some local act as a brokers as well, but are subject to certain rules that protect customer orders.

Long: - (1) The buying side of an open futures contract or futures option; (2) a trader whose net position in the futures or options market shows an excess of open purchases over open sales.

Margin: - Cash or equivalent posted as guarantee of fulfillment of a futures contract (not a down payment).



Margin call: - Demand for additional funds or equivalent because of adverse price movement or some other contingency.

Market to Market: - The practice of crediting or debiting a trader's account based on daily closing prices of the futures contracts he is long or short.

Market order: - An order for immediate execution at the best available price.

Nearby: - The futures contract closest to expiration.

Net position: - The difference between the open contracts long and the open contracts short held in any commodity by any individual or group.

Offer: - An offer indicating willingness to sell at a given price (opposite of bid).

On opening: - A term used to specify execution of an order during the opening.

Open contracts: - Contracts which have been brought or sold without the transaction having been completed by subsequent sale, repurchase or actual delivery or receipt of commodity.

Open interest: - The number of "open contracts". It refers to Unliquidated purchases or sales and never to their combined total.

Option: - It gives right but not the obligation to the option owner, to buy an underlying asset at specific price at specific time in the future.

Out-of-the money: - Option calls with the strike prices above the price of the underlying futures, and puts with strike prices below the price of the underlying futures.

Over the counter: - It is alternative trading platform, linked to network of dealers who do not physically meet but instead communicates through a network of phones & computers.

Pit: - An octagonal platform on the trading floor of an exchange, consisting of steps upon which traders and brokers stand while trading (if circular called ring).

Point: - The minimum unit in which changes in futures prices may be expressed (minimum price fluctuation may be in multiples of points).

Position: - An interest in the market in the form of open commodities.

Premium: - The amount by which a given futures contract's price or commodity's quality exceeds that of another contract or commodity (opposite of discount). In options, the price of a call or put, which the buyer initially pays to the option writer (seller).

Price limit: - The maximum fluctuation in price of futures contract permitted during one trading session, as fixed by the rules of a contract market.

Purchase and sales statement: - A statement sent by FMC to a customer when his futures option has been reduced or closed out (also called "P and S")

Put: - In options the buyer of a put has the right to continue a short position in an underlying futures contract at the strike price until the option expires; the seller(writer) of the put obligates himself to take a long position in the futures at the strike price if the buyer exercises his put.

Range: - The difference between high and low price of the futures contract during a given period.

Ratio hedging: - Hedging a cash position with futures on a less or more than one-for-one basis.

Reaction: - The downward tendency of a commodity after an advance.

Round turn: - The execution of the same customer of a purchase transaction and a sales transaction which offset each other.

Round turn commission: - The cost to the customer for executing a futures contract which is charged only when the position is liquidated.

Scalping: - For floor traders, the practice of trading in and out of contracts through out the trading day in a hopes for making a series of small profits.

Settlement price: - The official daily closing price of futures contract, set by the exchange for the purpose of setting margins accounts.

Short: - (1) The selling of an option futures contract. (2) A trader whose net position in the futures market shows an excess of open sales over open purchases.

Speculator: - Speculator is an additional buyer of the commodities whenever it seems that market prices are lower than they should be.

Spot Markets:- Here commodities are physically brought or sold on a negotiated basis.

Spot price: - The price at which the spot or cash commodity is selling on the cash or spot market.

Spread: - Spread is the difference in prices of two futures contracts.

Striking price: - In options, the price at which a futures position will be established if the buyer exercises (also called strike or exercise price).

Swap: - It is an agreement between two parties to exchange different streams of cash flows in future according to predetermined terms.

The two commonly used swaps are:

- Interest rate swaps: These entail swapping only the interest related cash flows between the parties in the same currency.
- Currency swaps: These entail swapping both principal and interest between the parties, with the cash flows in one direction being in a different currency than those in the opposite direction.

Swaptions : Swaptions are options to buy or sell a swap that will become operative at the expiry of the options. Thus a swaption is an option on a forward swap.

Technical analysis (charting): - In price forecasting, the use of charts and other devices to analyze price-change patters and changes in volume and open interest to predict future market trends (opposite of fundamental analysis).

Time value: - In options the value of premium is based on the amount of time left before the contract expires and the volatility of the underlying futures contract. Time value represents the portion of the premium in excess of intrinsic value. Time value diminishes as the expiration of the options draws near and/or if the underlying futures become less volatile.

Volume of trading (or sales): - A simple addition of successive futures transactions (a transaction consists of a purchase and matching sale).

Writer: - A sealer of an option who collects the premium payment from the buyer.

Study Note - 4

INFRASTRUCTURE FINANCING



This Study Note includes

- 4.1 Introduction
- 4.2 Evolution of Financing Needs in Indian Infrastructure
- 4.3 Infrastructure Financing Methods- Present Scenario
- 4.4 Project Financing versus Capital Financing
- 4.5 Risk Management in Infrastructure Projects
- 4.6 Financing Infrastructure Development: Recent Trends and Institutional Initiatives
- 4.7 SEBI regulations relating to Infrastructure Sector
- 4.8 Legal form of Organisation
- 4.9 Sources of Infrastructure Investment in India
- 4.10 Financial Objective
- 4.11 Projected Investment in the Infrastructure Sector during the Twelfth Plan
- 4.12 Investment and Dividend Decision
- 4.13 The Interest Rates have Been recently revised by the Board
- 4.14 Issues in Infrastructure Financing
- 4.15 Need for an Efficient and Vibrant Corporate Bond Market
- 4.16 Measures taken by the Central Government
- 4.17 Price Indices
- 4.18 Internal Sources of Finance
- 4.19 Short Term Sources
- 4.20 Issues and Challenges Constraining Infrastructure Funding
- 4.21 Primary & Secondary Market Structure

4.1 INTRODUCTION

Infrastructure is basic physical and organizational structures needed for the operation of a society or enterprise, or the services and facilities necessary for an economy to function. It can be generally defined as the set of interconnected structural elements that provide framework supporting an entire structure of development. It is an important term for judging a country or region's development.

The term typically refers to the technical structures that support a society, such as roads, bridges, water supply, sewers, electrical grids, telecommunications, and so forth, and can be defined as "the physical components of interrelated systems providing commodities and services essential to enable, sustain, or enhance societal living conditions."

Viewed functionally, infrastructure facilitates the production of goods and services, and also the distribution of finished products to markets, as well as basic social services such as schools and hospitals; for example, roads enable the transport of raw materials to a factory. In military parlance, the term refers to the buildings and permanent installations necessary for the support, redeployment, and operation of military forces. To make it simple, infrastructure is anything that is needed everyday, an everyday item.

4.1.1 "Hard" versus "Soft" infrastructure

In this article, "hard" infrastructure refers to the large physical networks necessary for the functioning of a modern industrial nation, whereas "soft" infrastructure refers to all the institutions which are required to maintain the economic, health, and cultural and social standards of a country, such as the financial system, the education system, the health care system, the system of government, and law enforcement, as well as emergency services.

4.1.2 Types of hard infrastructure

The following list of hard infrastructure is limited to capital assets that serve the function of conveyance or channelling of people, vehicles, fluids, energy, or information, and which take the form either of a network or of a critical node used by vehicles, or used for the transmission of electro-magnetic waves.

Infrastructure systems include both the fixed assets, and the control systems and software required to operate, manage and monitor the systems, as well as any accessory buildings, plants, or vehicles that are an essential part of the system. Also included are fleets of vehicles operating according to schedules such as public transit buses and garbage collection, as well as basic energy or communications facilities that are not usually part of a physical network, such as oil refineries, radio, and television broadcasting facilities.

Transport infrastructure

- Road and highway networks, including structures (bridges, tunnels, culverts, retaining walls), signage and markings, electrical systems (street lighting and traffic lights), edge treatments (curbs, sidewalks, landscaping), and specialized facilities such as road maintenance depots and rest areas
- Mass transit systems (Commuter rail systems, subways, tramways, trolleys, City Bicycle Sharing system, City Car Sharing system and bus transportation)
- Railways, including structures, terminal facilities (rail yards, railway stations), level crossings, signalling and communications systems
- Canals and navigable waterways requiring continuous maintenance (dredging, etc.)
- Seaports and lighthouses
- Airports, including air navigational systems
- Bicycle paths and pedestrian walkways, including pedestrian bridges, pedestrian underpasses and other specialized structures for cyclists and pedestrians
- Ferries

Energy infrastructure

- Electrical power network, including generation plants, electrical grid, substations, and local distribution.
- Natural gas pipelines, storage and distribution terminals, as well as the local distribution network. Some definitions may include the gas wells, as well as the fleets of ships and trucks transporting liquefied gas.
- Petroleum pipelines, including associated storage and distribution terminals. Some definitions may include the oil wells, refineries, as well as the fleets of tanker ships and trucks.
- Specialized coal handling facilities for washing, storing, and transporting coal. Some definitions may include Coal mines.
- Steam or hot water production and distribution networks for district heating systems.
- Electric vehicle networks for charging electric vehicles.

Coal mines, oil wells and natural gas wells may be classified as being part of the mining and industrial sector of the economy, not part of infrastructure.

Water management infrastructure

- Drinking water supply, including the system of pipes, storage reservoirs, pumps, valves, filtration and



treatment equipment and meters, including buildings and structures to house the equipment, used for the collection, treatment and distribution of drinking water

- Sewage collection, and disposal of waste water
- Drainage systems (storm sewers, ditches, etc.)
- Major irrigation systems (reservoirs, irrigation canals)
- Major flood control systems (dikes, levees, major pumping stations and floodgates)
- Large-scale snow removal, including fleets of salt spreaders, snow plows, snowblowers, dedicated dump trucks, sidewalk plows, the dispatching and routing systems for these fleets, as well as fixed assets such as snow dumps, snow chutes, snow melters
- Coastal management, including structures such as seawalls, breakwaters, groynes, floodgates, as well as the use of soft engineering techniques such as beach nourishment, sand dune stabilization and the protection of mangrove forests and coastal wetlands.

Communications infrastructure

- Postal service, including sorting facilities
- Telephone networks (land lines) including telephone exchange systems
- Mobile phone networks
- Television and radio transmission stations, including the regulations and standards governing broadcasting
- Cable television physical networks including receiving stations and cable distribution networks (does not include content providers or "networks" when used in the sense of a specialized channel such as CNN or MTV)
- The Internet, including the internet backbone, core routers and server farms, local internet service providers as well as the protocols and other basic software required for the system to function (does not include specific websites, although may include some widely-used web-based services, such as social network services and web search engines)
- Communications satellites
- Undersea cables
- Major private, government or dedicated telecommunications networks, such as those used for internal communication and monitoring by major infrastructure companies, by governments, by the military or by emergency services, as well as national research and education networks
- Pneumatic tube mail distribution networks

Solid waste management

- Municipal garbage and recyclables collection
- Solid waste landfills
- Solid waste incinerators and plasma gasification facilities
- Materials recovery facilities
- Hazardous waste disposal facilities

Earth monitoring and measurement networks

- Meteorological monitoring networks
- Tidal monitoring networks
- Stream Gauge or fluvimetric monitoring networks
- Seismometer networks
- Earth observation satellites
- Geodetic benchmarks
- Global Positioning System
- Spatial Data Infrastructure

4.1.4 Types of soft infrastructure

Soft infrastructure includes both physical assets such as highly specialized buildings and equipment, as well as non-physical assets such as the body of rules and regulations governing the various systems, the financing of these systems, as well as the systems and organizations by which highly skilled and specialized professionals are trained, advance in their careers by acquiring experience, and are disciplined if required by professional associations (professional training, accreditation and discipline).

Unlike hard infrastructure, the essence of soft infrastructure is the delivery of specialized services to people. Unlike much of the service sector of the economy, the delivery of those services depend on highly developed systems and large specialised facilities or institutions that share many of the characteristics of hard infrastructure.

Governance infrastructure

- The system of government and law enforcement, including the political, legislative, law enforcement, justice and penal systems, as well as specialized facilities (government offices, courthouses, prisons, etc.), and specialized systems for collecting, storing and disseminating data, laws and regulation
- Emergency services, such as police, fire protection, and ambulances, including specialized vehicles, buildings, communications and dispatching systems
- Military infrastructure, including military bases, arms depots, training facilities, command centers, communication facilities, major weapons systems, fortifications, specialised arms manufacturing, strategic reserves

Economic infrastructure

- The financial system, including the banking system, financial institutions, the payment system, exchanges, the money supply, financial regulations, as well as accounting standards and regulations
- Major business logistics facilities and systems, including warehouses as well as warehousing and shipping management systems
- Manufacturing infrastructure, including industrial parks and special economic zones, mines and processing plants for basic materials used as inputs in industry, specialized energy, transportation and water infrastructure used by industry, plus the public safety, zoning and environmental laws and regulations that govern and limit industrial activity, and standards organizations
- Agricultural, forestry and fisheries infrastructure, including specialized food and livestock transportation and storage facilities, major feedlots, agricultural price support systems (including agricultural insurance), agricultural health standards, food inspection, experimental farms and agricultural research centers and schools, the system of licencing and quota management, enforcement systems against poaching, forest wardens, and fire fighting



Social infrastructure

- The health care system, including hospitals, the financing of health care, including health insurance, the systems for regulation and testing of medications and medical procedures, the system for training, inspection and professional discipline of doctors and other medical professionals, public health monitoring and regulations, as well as coordination of measures taken during public health emergencies such as epidemics
- The educational and research system, including elementary and secondary schools, universities, specialised colleges, research institutions, the systems for financing and accrediting educational institutions
- Social welfare systems, including both government support and private charity for the poor, for people in distress or victims of abuse

Cultural, sports and recreational infrastructure

- Sports and recreational infrastructure, such as parks, sports facilities, the system of sports leagues and associations
- Cultural infrastructure, such as concert halls, museums, libraries, theatres, studios, and specialized training facilities
- Business travel and tourism infrastructure, including both man-made and natural attractions, convention centers, hotels, restaurants and other services that cater mainly to tourists and business travelers, as well as the systems for informing and attracting tourists, and travel insurance

4.1.4 Typical attributes

Hard infrastructure generally has the following attributes:

(i) Capital assets that provide services

These are physical assets that provide services. The people employed in the hard infrastructure sector generally maintain, monitor, and operate the assets, but do not offer services to the clients or users of the infrastructure. Interactions between workers and clients are generally limited to administrative tasks concerning ordering, scheduling, or billing of services.

(ii) Large networks

These are large networks constructed over generations, and are not often replaced as a whole system. The network provides services to a geographically defined area, and has a long life because its service capacity is maintained by continual refurbishment or replacement of components as they wear out.

(iii) Historicity and interdependence

The system or network tends to evolve over time as it is continuously modified, improved, enlarged, and as various components are rebuilt, decommissioned or adapted to other uses. The system components are interdependent and not usually capable of subdivision or separate disposal, and consequently are not readily disposable within the commercial marketplace. The system interdependency may limit a component life to a lesser period than the expected life of the component itself.

(iv) Natural monopoly

The systems tend to be natural monopolies, insofar that economies of scale means that multiple agencies providing a service are less efficient than would be the case if a single agency provided the service. This is because the assets have a high initial cost and a value that is difficult to determine. Once most of the system is built, the marginal cost of servicing additional clients or users tends to be relatively inexpensive, and may be negligible if there is no need to increase the peak capacity or the geographical extent of the network.

In public economics theory, infrastructure assets such as highways and railways tend to be public goods, in that they carry a high degree of non-excludability, where no household can be excluded from using it, and non-rivalry, where no household can reduce another from enjoying it. These properties lead to externality, free ridership, and spillover effects that distort perfect competition and market efficiency. Hence, government becomes the best actor to supply the public goods.

4.1.5 Economics, management, engineering, and impacts

The following concerns mainly hard infrastructure and the specialized facilities used for soft infrastructure:

(i) Ownership and financing

Infrastructure may be owned and managed by governments or by private companies, such as sole public utility or railway companies. Generally, most roads, major ports and airports, water distribution systems and sewage networks are publicly owned, whereas most energy and telecommunications networks are privately owned. Publicly owned infrastructure may be paid for from taxes, tolls, or metered user fees, whereas private infrastructure is generally paid for by metered user fees. Major investment projects are generally financed by the issuance of long-term bonds.

An interesting comparison between privatization versus government-sponsored public works involves high speed rail (HSR) projects in East Asia. In 1998, the Taiwan government awarded the Taiwan High Speed Rail Corporation, a private organization, to construct the 345 km line from Taipei to Kaohsiung in a 35-year concession contract. Conversely, in 2004 the South Korean government charged the Korean High Speed Rail Construction Authority, a public entity, to construct its high speed rail line, 412 km from Seoul to Busan, in two phases. While different implementation strategies, Taiwan successfully delivered the HSR project in terms of project management (time, cost, and quality), whereas South Korea successfully delivered its HSR project in terms of product success (meeting owners' and users' needs, particularly in ridership). Additionally, South Korea successfully created a technology transfer of high speed rail technology from French engineers, essentially creating an industry of HSR manufacturing capable of exporting knowledge, equipment, and parts worldwide.

Henceforth, government owned and operated infrastructure may be developed and operated in the private sector or in public-private partnerships, in addition to in the public sector. In the United States, public spending on infrastructure has varied between 2.3% and 3.6% of GDP since 1950. Many financial institutions invest in infrastructure.

(ii) Infrastructure as a new asset class for pension funds and SWFs

Most pension funds have long-dated liabilities, with matching long-term investments. These large institutional investors need to protect the long-term value of their investments from inflationary debasement of currency and market fluctuations, and provide recurrent cash flows to pay for retiree benefits in the short-medium term: from that perspective, think-tanks such as the World Pensions Council (WPC) have argued that infrastructure is an ideal asset class that provides tangible advantages such as long duration (facilitating cash flow matching with long-term liabilities), protection against inflation and statistical diversification (low correlation with 'traditional' listed assets such as equity and fixed income investments), thus reducing overall portfolio volatility.

Private infrastructure fund is a one of the fastest growing private investment class after Private Equity, Private Debt and Private Real Estate. The importance of private infrastructure fund is gaining traction as developed countries are facing budget deficit and look to private sector for infrastructure financing.

(iii) Infrastructure debt

Infrastructure debt is a complex investment category reserved for highly sophisticated institutional investors who can gauge jurisdiction-specific risk parameters, assess a project's long-term viability, understand transaction risks, conduct due diligence, negotiate (multi)creditors' agreements, make timely decisions on consents and waivers, and analyze loan performance over time.



Research conducted by the World Pensions Council (WPC) suggests that most UK and European pensions wishing to gain a degree of exposure to infrastructure debt have done so indirectly, through investments made in infrastructure funds managed by specialized Canadian, US and Australian funds.

On November 29, 2011, the British government unveiled an unprecedented plan to encourage large-scale pension investments in new roads, hospitals, airports, etc. across the UK. The plan is aimed at enticing 20 billion pounds (\$30.97 billion) of investment in domestic infrastructure projects.

4.1.6 Impact on economic development

Investment in infrastructure is part of the capital accumulation required for economic development and may have an impact on socioeconomic measures of welfare. The causality of infrastructure and economic growth has always been in debate. In developing nations, expansions in electric grids, roadways, and railways show marked growth in economic development. However, the relationship does not remain in advanced nations who witness more and more lower rates of return on such infrastructure investments.

Nevertheless, infrastructure yields indirect benefits through the supply chain, land values, small business growth, consumer sales, and social benefits of community development and access to opportunity. The American Society of Civil Engineers cite the many transformative projects that have shaped the growth of the United States including the Transcontinental Railroad that connected major cities from the Atlantic to Pacific coast; the Panama Canal that revolutionized shipment in connected the two oceans in the Western hemisphere; the Interstate Highway System that spawned the mobility of the masses; and still others that include the Hoover Dam, Trans-Alaskan pipeline, and many bridges (the Golden Gate, Brooklyn, and Bay Bridge). All these efforts are testimony to the infrastructure and economic development correlation.

4.2 EVOLUTION OF FINANCING NEEDS IN INDIAN INFRASTRUCTURE

India has emerged as one of the fastest growing economies even in the difficult financial downturn era. In coming years, India will be demanding a large number of infrastructure services to match the demand and keep an upward sloping growth curve. Indian infrastructure including both soft (port services, air and telecom) and hard (road, railways and airways) infrastructure is growing at a fast pace at present. The country also has largest road network (3.34 million km) and second largest rail network of the world.

Requirement for investment in infrastructure projects was expected to increase by 145.6% from Five Year Plan 2002-07 to FYP 2007-11. Part of the investment is expected to come from the various resources as public private partnerships and public investments. Indian government is also trying to experiment with different tools of PPP (public private partnerships) financing such as VGF (viability gap financing), SPV (special purpose vehicle) to decrease the deficits on the accounts of infrastructure.

Government has made various efforts to match the growth in infrastructure with country's economy growth. However, Indian infrastructure is still lagging behind globally. This study analyzes existing frameworks available for financing and risk involved in them. India has lot of opportunity to grow using public private partnership model, but still the numbers of project financed are very less. We also have studied project financing model and capital financing model which are used by various competitive countries to India.

A regression analysis has been conducted on a macroeconomic model of investment in

infrastructure which takes into account the exogenous variables interest rate, inflation rate, foreign exchange rate (USD/INR) and nominal gross domestic product based on Indian data from 1987-2010. Here we study how changes in any one of the aforementioned factors impact the infrastructure investment. The paper also tries to find out the correlation between and trends followed by CNX Infra and S&P 500 based on daily time series for both.

4.2.1 State of Indian infrastructure

Indian infrastructure is currently under a major overhaul. It is being increasingly noticed that in order to sustain the high growth rates of 8-9 percent achieved by India in the past few years need to be supported by corresponding improvement in infrastructure. Moreover, the financing in Indian infrastructure is gradually moving away from public to private realm. It is expected in the 12th Five-Year plan's 50% of investment in infrastructure will come through the private route.

According to Goldman Sachs, the country would need investments of more than \$1 trillion in infrastructure from 2010 to 2019, with roads entailing \$427 billion, power \$288 billion and railways \$281 billion (Goldman Sachs). So far, India's success across the sectors has been mixed. Capacity under construction or fully constructed according to the Eleventh Year Plan (Annexure 1) reveals that the only sector on track is the power sector, achieving 100 percent of planned capacity, while ports sector is at 85 percent, the airports sector at 75 percent and the roads sector at 50 percent. The repercussion, India is close to a deficit of USD 150 billion to USD 190 billion.

The definition of infrastructure as provided by UNESCAP is a term used to refer to the basic architecture of any system, mechanical, social, political or cultural (United Nations Economic and Social Council for Asia and Pacific). The expanded definition of infrastructure includes transport (Roads, Railways, Ports, and Airports), public utilities (Power and Water Supply etc.), public services (Fire Service, Flood Protection, and Police etc.), national services (defense, monetary and postal systems and the legal and regulatory system) along with "soft infrastructure" which denotes institutions that maintain the health and cultural standards of the population.

4.2.2 The key reasons to invest in infrastructure in India are as follows:

- (i) **Infrastructure: Major growth driver:** The booming Indian economy combined with the high population growth rate is creating tremendous pressure to modernize, sustain and accelerate investment in country's infrastructure. This has become more prominent over the past few decades since the investment backlog has exceeded billions.
- (ii) **Private Capital Requirements:** The basis of economic activity is infrastructure. India could have grown faster had the investments in infrastructure been commiserate with economic activity. Construction activity has a direct impact on output and all economic sectors benefit from comprehensive infrastructure.
- (iii) **Immense Regional Disparities:** Inter-state disparity in per capita income among Indian states has been rising over the last couple of decades. In addition, the inter-state disparities in economic and social infrastructure facilities too have remained at alarmingly high levels. Hence, investment in infrastructure is required in order to boost inter-state level of development.
- (iv) **Managing Institutional Risks:** The big infrastructure opportunities are not without inherent risks like macroeconomic risks associated with emerging markets like India, low degree of liquidity in markets and unsatisfactory transparency of market players and the market itself. Therefore, these risks need to be managed competently for Indian infrastructure to flourish

4.3 INFRASTRUCTURE FINANCING METHODS- PRESENT SCENARIO

4.3.1 Municipal bonds

This methodology is an excellent opportunity but is least used to mobilize debt financing. Indian government offers two types of municipal bonds: Revenue Bonds and Government Obligation Bonds. Government has come in association with IL&FS to induce good credit quality and reliability in debt instrument market. If local government wants to issue municipal bonds, they need to provide financial structure (Type of debt: GO or RO, terms, repayment plan, interest rates), credit rating issued by ICRA or CARE, authorization and approval documents, prospectus (information of potential investors, disclosures), guarantees and transaction costs



4.3.2 Pool Financing

Due to the budgetary constraints, it was difficult for local small governments to exploit the 'municipal bond mechanism' and generate long term financing debt. The other issues with municipal bonds was high fixed issuance cost percentage and availability in less quantity and hence they weren't able to lure the institutional investors.

Pooling technique is used in order to facilitate a SPV and create the interest of capital market for local small government. Tamil Nadu and Karnataka were the first two states to use this technique in 2002 to issue the bonds of ₹ 130.4 Crore for sanitization and water project in 14 local governments. It used the US based bond bank model which hypothetically form and administer a SPV and also issue the bonds on its own name for the group of local governments. From this hypothetical unit the local government borrows and the repayment of these borrowed funds is done by the pooled government.

4.3.3 Urban infrastructure funds

A local government which is inefficient in raising commercial capital on its own due to less credit rating or structural bottlenecks, UIFs is an initiative by government. Four types of funds (Capital fund, project development funds and credit rating enhancement fund, Grant fund) are maintained and are managed by the PDC or internal staff. The main objectives of these funds are to provide the access of funds to the incompetent local government, reduce cost of capital, promote PPP and develop urban infrastructure projects.

4.3.4 Microfinance

This new innovative tool is to facilitate the triple bottom population and provide them opportunities to build infrastructure. India's more than 30% population lives in slum areas and seeing their financial weakness, no commercial bank or municipal bond is accessible. SKS, APS (2004) and other MFIs took the responsibility and provided funds at high interest rates. Even though this tool is to promote more PPP, but interest rates are very high that repayments become default.

4.3.5 Public Private Partnership

The major challenges faced by infrastructure financing are non channelized savings (1/3rd of savings are in physical assets), regulated earning, mismatch in asset and liability, immature debt markets, limited resources and also high regulatory constraints. PPP (public private partnership) using various partnership model (BOT, DBB, BOO, BOOT) is to facilitate easy access of capital for infrastructure projects. One of the tools of PPP is VGF (viability gap financing) which had high return but high risk as well. New financing resources need to be developed not only on the debt side but also on the equity side.

4.3.6 NBFC and FIs

Even though NBFC institutes have huge potential and growth momentum, many bureaucratic guidelines trap the capital for a long time and hence create undiversified risk. To boost the confidence of these investors and facilitate requirements, asset as well as liability side management needs to be looked into.

On the asset side modifications in securitization norms, underwriting norms and NBFC norms are required. The current NBFC guidelines can be altered by relaxing the limit on single and group borrower and on capital funded. Similarly on the liability side allowing FIs, banks and NBFCs to borrow from foreign institutes, long term hedging using gold and reducing the SLR limits will help banks diversify the constituted risk.

4.3.7 Debt financing by Indian commercial banks

Many Indian banks such as SBI, IDB, and PNB give loan for infrastructure financing. Indian government has legalized few banks in country to issue debt for infrastructure financing in urban area. These loans are easily available but contain complex procedure, as for banks there are high default risk involved. Moreover one more disadvantage with commercial banks loan is high interest rates which discourage investors to raise money from these resources.

4.3.8 International Debt financing

The main resources of international debt financing are international funds, multilateral agencies, equipment suppliers, export credit agencies, bond markets, and commercial banks. Many dedicated funds from world development banks have been given (from \$200 million). Many bilateral agencies also fund infrastructure projects but opportunities are very limited in this aspect.

4.4 PROJECT FINANCING VERSUS CAPITAL FINANCING

Countries across the globe use Project Finance vis-à-vis Corporate Finance in industries like infrastructure where there are large cash flows. Project Finance involves significant costs compare to Corporate Finance however the mitigation of Agency Cost (since certain assets like tangible assets with high cash flows are susceptible to costly agency conflicts) and reduction in the deadweight cost of bankruptcy are primary motivators for using Project Finance (Subramanian, Tung, & Wang, 2007). The creation of a project company provides an opportunity to create asset-specific, new governance systems to address the conflicts between ownership and control. Another feature of Project Companies is that they utilize high leverage and joint ownership to discourage costly agency conflicts.

Two main distinguishing features of Project Finance compared to Corporate Finance are:

- a) **Enhanced verifiability of cash flows:** Due to contractual agreements possible because of a single, discrete project in legal isolation from the sponsor and the resultant absence of future growth opportunities in the Project Financed Company. Since Corporate Finance involves a multitude of future and current projects the same contractual agreements cannot be effected in Corporate Finance Company, and
- b) **Lack of sponsors' assets and cash flows:** In case of Corporate Finance the lender has a potentially larger pool of cash flows from which to get paid as compared to Project Finance where the cash flows from the project only are used to pay the investors.

According to some empirical researches, Project Finance is more likely than Corporate Finance in countries where the investor protection against managerial self-dealing is weaker and investor protection is low. This can be better understood in terms of comparison between the neighboring countries: India and China. India used predominantly Project Financing for Infrastructure Projects while China has started using Capital Finance for its huge infrastructure projects.

4.5 RISK MANAGEMENT IN INFRASTRUCTURE PROJECTS

The raising of debt and equity capital needed to fulfill the financing needs of infrastructure in developing countries continues to remain a challenge. Over the last couple of decades there has been a growing interest in using risk mitigation instruments to facilitate mobilization of private capital to finance public and private infrastructure projects. Risk Mitigation Instruments are financial instruments that transfer certain defined risks from project financiers (lenders and equity investors) to creditworthy third parties (guarantors and investors) that have a better capacity to deal with such risks. These instruments are extremely helpful for the governments of developing countries that have low credit ratings or insufficient track record in the eyes of the private investors to be able to attract private capital. For India, risk management is crucial as this has been a major roadblock in attracting the required private investment in the infrastructure sector.

The advantages of risk mitigation for India are many:

- India would be able to mobilize international and domestic private capital for development of infrastructure and as a supplement to limited public resources.
- When risk mitigation instruments cover the excessive risks or practically unmanageable risks as perceived by the investors, then private investors would be interested in investing in the sector.



- It becomes easier for the Government to share the risks of infrastructure development using its limited financial resources when it is tendered help by the private sector; thereby leading to greater increase in infrastructural development.
- Government can upgrade its own credit as borrower or as a guarantor for public and private projects by using risk mitigation instruments of more creditworthy institutions which can significantly lower the cost of capital for the infrastructure project.
- Risk mitigation instruments facilitate the creation of commercial and sustainable financing mechanisms for infrastructure development and efficiency in the flow of international and local private capital.

India today stands on the brink of a revolution in infrastructure facilities, which is not to be missed at any cost. It has been amply demonstrated that in order to sustain and accelerate a high GDP growth rate in the coming years, significant amount of infrastructure improvement will be required. An investment target of this magnitude poses significant challenge from the perspective of availability of financial resources. A judicious mix of political, economic, legal and social environment needs to be created that balances the twin objectives of growth and stability. The key here is to ensure that the financial system is in a position to effectively extend a large amount of public and private investments. At the same time foreign investments should also be given prime importance. All the players involved in the investment financing space for infrastructure should be developed to their full potential and extended full support by the Government.

The huge investments required in infrastructure cannot be met by the Government alone in an optimum manner, thus there is a need to engage more investors for meeting these needs. Even though the Indian Financial System faces no problems of liquidity, still the risk-averse nature of Indian investors, the comparatively small capitalization of various financial intermediaries requires revisiting the current financial models and adopting innovative financial structures. There are two types of risk capital involved in the infrastructure sector: (a) Explicit Capital, which is brought by the project sponsors as equity, and (b) Implicit Capital, which is provided by the project lenders. Greater flow of Explicit Risk Capital can be ensured by removing the controllable uncertainties in the policy environment and making the benefits of risk diversification available through alternate mechanisms. Also, various regulatory initiatives and market reforms are required to capacitate the commercial banking system to participate more effectively for fulfilling the financing needs of Indian infrastructure.

4.6 FINANCING INFRASTRUCTURE DEVELOPMENT: RECENT TRENDS AND INSTITUTIONAL INITIATIVES

4.6.1 Budgetary Support and Institutional Borrowings

The system of managing and financing infrastructural facilities has been changing significantly since the mid-eighties. The Eighth Plan (1992-97) envisaged cost recovery to be built into the financing system. This has further been reinforced during the Ninth Plan period (1997-2002) with a substantial reduction in budgetary allocations for infrastructure development. A strong case has been made for making the public agencies accountable and financially viable. Most of the infrastructure projects are to be undertaken through institutional finance rather than budgetary support. The state level organisations responsible for providing infrastructural services, metropolitan and other urban development agencies are expected to make capital investments on their own, besides covering the operational costs for their infrastructural services. The costs of borrowing have gone up significantly for all these agencies over the years. This has come in their way of their taking up schemes that are socially desirable schemes but are financially unremunerative. Projects for the provision of water, sewerage and sanitation facilities etc., that generally have a long gestation period and require a substantial component of subsidy, have, thus, received a low priority in this changed policy perspective.

Housing and Urban Development Corporation (HUDCO), set up in the sixties by the Government of India to support urban development schemes, had tried to give an impetus to infrastructural projects

by opening a special window in the late eighties. Availability of loans from this window, generally at less than the market rate, was expected to make state and city level agencies, including the municipalities, borrow from HUDCO. This was more so for projects in cities and towns with less than a million population since their capacity to draw upon internal resources was limited.

HUDCO finances even now up to 70 per cent of the costs in case of public utility projects and social infrastructure. For economic and commercial infrastructure, the share ranges from 50 per cent for the private agencies to 80 per cent for public agencies. The loan is to be repaid in quarterly installments within a period of 10 to 15 years, except for the private agencies for whom the repayment period is shorter. The interest rates for the borrowings from HUDCO vary from 15 per cent for utility infrastructure of the public agencies to 19.5 per cent for commercial infrastructure of the private sector. The range is much less than what used to be at the time of opening the infrastructure window by HUDCO. This increase in the average rate of interest and reduction in the range is because its average cost of borrowing has gone up from about 7 per cent to 14 per cent during the last two and a half decade.

Importantly, HUDCO loans were available for upgrading and improving the basic services in slums at a rate lower than the normal schemes in the early nineties. These were much cheaper than under similar schemes of the World Bank. However, such loans are no longer available. Also, earlier the Corporation was charging differential interest rates from local bodies in towns and cities depending upon their population size. For urban centres with less than half a million population, the rate was 14.5 per cent; for cities with population between half to one million, it was 17 per cent; and for million plus cities, it was 18 per cent. No special concessional rate was, however, charged for the towns with less than a hundred or fifty thousand population that are in dire need of infrastructural improvement, as discussed above.

It is unfortunate, however, that even this small bias in favour of smaller cities has now been given up. Further, HUDCO was financing up to 90 per cent of the project cost in case of infrastructural schemes for "economically weaker sections" which, too, has been discontinued in recent years.

HUDCO was and continues to be the premiere financial institution for disbursing loans under the Integrated Low Cost Sanitation Scheme of the government. The loans as well as the subsidy components for different beneficiary categories under the scheme are released through the Corporation. The amount of funds available through this channel has gone down drastically in the nineties.

Given the stoppage of equity support from the government, increased cost of resource mobilisation, and pressure from international agencies to make infrastructural financing commercially viable, HUDCO has responded by increasing the average rate of interest and bringing down the amounts advanced to the social sectors. Most significantly, there has been a reduction in the interest rate differentiation, designed for achieving social equity.

An analysis of infrastructural finances disbursed through HUDCO shows that the development authorities and municipal corporations that exist only in larger urban centres operate have received more than half of the total amount. The agencies like Water Supply and Sewerage Boards and Housing Boards, that have the entire state within their jurisdiction, on the other hand, have received altogether less than one third of the total loans. Municipalities with less than a hundred thousand population or local agencies with weak economic base often find it difficult to approach HUDCO for loans. This is so even under the central government schemes like the Integrated Development of Small and Medium Towns, routed through HUDCO, that carry a subsidy component. These towns are generally not in a position to obtain state government's guarantee due to their uncertain financial position. The central government and the Reserve Bank of India have proposed restrictions on many of the states for giving guarantees to local bodies and para-statal agencies, in an attempt to ensure fiscal discipline.

Also, the states are being persuaded to register a fixed percentage of the amount guaranteed by them as a liability in their accounting system. More importantly, in most of the states, only the para-statal agencies and municipal corporations have been given state guarantee with the total exclusion of smaller municipal bodies. Understandably, getting bank guarantee is even more difficult, specially, for the urban centres in less developed states and all small and medium towns.



The Infrastructure Leasing and Financial Services (ILFS), established in 1989, is coming up as an important financial institution in recent years. It is a private sector financial intermediary wherein the Government of India owns a small equity share. Its activities have more or less remained confined to development of industrial-townships, roads and highways where risks are comparatively less. It basically undertakes project feasibility studies and provides a variety of financial as well as engineering services. Its role, therefore, is that of a merchant banker rather than of a mere loan provider so far as infrastructure financing is considered and its share in the total infrastructural finance in the country remains limited.

ILFS has helped local bodies, para-statal agencies and private organisations in preparing feasibility reports of commercially viable projects, detailing out the pricing and cost recovery mechanisms and establishing joint venture companies called Special Purpose Vehicles (SPV).

Further, it has become equity holders in these companies along with other public and private agencies, including the operator of the BOT project (Mathur 1999). The role of ILFS may, thus, be seen as a promoter of a new perspective of development and a participatory arrangement for project financing. It is trying to acquire the dominant position for the purpose of influencing the composition of infrastructural projects and the system of their financing in the country.

Mention must be made here of the Financial Institutions Reform and Expansion (FIRE) Programme, launched under the auspices of the USAID. Its basic objective is to enhance resource availability for commercially viable infrastructure projects through the development of domestic debt market. Fifty per cent of the project cost is financed from the funds raised in US capital market under Housing Guaranty fund. This has been made available for a long period of thirty years at an interest rate of 6 percent, thanks to the guarantee from the US-Congress.

The risk involved in the exchange rate fluctuation due to the long period of capital borrowing is being mitigated by a swapping arrangement through the Grigsby Bradford and Company and Government Finance Officers' Association for which they would charge an interest rate of 6 to 7 percent. The interest rate for the funds from US market, thus, does not work out as much cheaper than that raised internally.

The funds under the programme are being channelled through ILFS and HUDCO who are expected to raise a matching contribution for the project from the domestic debt market. A long list of agenda for policy reform pertaining to urban governance, land management, pricing of services etc. have been proposed for the two participating institutions. For providing loans under the programme, the two agencies are supposed to examine the financial viability or bankability of the projects. This, it is hoped, would ensure financial discipline on the part of the borrowing agencies like private and public companies, municipal bodies, para-statal agencies etc. as also the state governments that have to stand guarantee to the projects. The major question, here, however is whether funds from these agencies would be available for social sectors schemes that have a long gestation period and low commercial viability.

Institutional funds are available also under Employees State Insurance Scheme and Employer's Provident Fund. These have a longer maturity period and are, thus, more suited for infrastructure financing. There are, however, regulations requiring the investment to be channeled in government securities and other debt instruments in a "socially desirable" manner. Government, however, is seriously considering proposals to relax these stipulations so that the funds can be made available for earning higher returns, as per the principle of commercial profitability.

There are several international actors that are active in the infrastructure sector like the Governments of United Kingdom (through Department for International Development), Australia, Netherlands. These have taken up projects pertaining to provision of infrastructure and basic amenities under their bilateral co-operation programmes. Their financial support, although very small in comparison with that coming from other agencies discussed below, has generally gone into projects that are unlikely to be picked up by private sector and may have problems of cost recovery. World Bank, Asian Development Bank, OECF (Japan), on the other hand, are the agencies that have financed infrastructure projects that are commercially viable and have the potential of being replicated on a large scale. The share of these agencies in the total funds into infrastructure sector is substantial. The problem, here, however, is that the funds have generally been made available when the borrowing agencies are able to involve

private entrepreneurs in the project or mobilise certain stipulated amount from the capital market. This has proved to be a major bottleneck in the launching of a large number of projects. Several social sector projects have failed at different stages of formulation or implementation due to their long pay back period and uncertain profit potential. These projects also face serious difficulties in meeting the conditionalities laid down by the international agencies.

4.6.2 Borrowings by State Government and Public Undertakings from Capital Market

A strong plea has been made for mobilising resources from the capital market for infrastructural investment. Unfortunately, there are not many projects in the country that have been perceived as commercially viable, for which funds can easily be lifted from the market.

The weak financial position and revenue sources of the state undertakings in this sector make this even more difficult. As a consequence, innovative credit instruments have been designed to enable the local bodies tap the capital market.

Bonds, for example, are being issued through institutional arrangements in such a manner that the borrowing agency is required to pledge or escrow certain buoyant sources of revenue for debt servicing. This is a mechanism by which the debt repayment obligations are given utmost priority and kept independent of the overall financial position of the borrowing agency. It ensures that a trustee would monitor the debt servicing and that the borrowing agency would not have access to the pledged resources until the loan is repaid.

The most important development in the context of investment in infrastructure and amenities is the emergence of credit rating institutions in the country. With the financial markets becoming global and competitive and the borrowers' base increasingly diversified, investors and regulators prefer to rely on the opinion of these institutions for their decisions. The rating of the debt instruments of the corporate bodies, financial agencies and banks are currently being done by the institutions like Information and Credit Rating Agency of India (ICRA), Credit

Analysis and Research (CARE) and Credit Rating Information Services of India Limited (CRISIL) etc. The rating of the urban local bodies has, however, been done so far by only CRISIL, that too only since 1995-96.

Given the controls of the state government on the borrowing agencies, it is not easy for any institution to assess the "functioning and managerial capabilities" of these agencies in any meaningful manner so as to give a precise rating. Furthermore, the "present financial position" of an agency in no way reflects its strength or managerial efficiency. There could be several reasons for the revenue income, expenditure and budgetary surplus to be high other than its administrative efficiency. Large sums being received as grants or as remuneration for providing certain services could explain that. The surplus in the current or capital account can not be a basis for cross-sectional or temporal comparison since the user charges permitted by the state governments may vary.

More important than obtaining the relevant information, there is the problem of choosing a development perspective. The rating institutions would have difficulties in deciding whether to go by measures of financial performance like total revenue including grants or build appropriate indicators to reflect managerial efficiency. One can possibly justify the former on the ground that for debt servicing, what one needs is high income, irrespective of its source or managerial efficiency. This would, however, imply taking a very short-term view of the situation. Instead, if the rating agency considers level of managerial efficiency, structure of governance or economic strength in long-term context, it would be able to support the projects that may have debt repayment problems in the short run but would succeed in the long run. The indicators that it may then consider would pertain to the provisions in state legislation regarding decentralisation, stability of the government in the city and the state, per capita income of the population, level of industrial and commercial activity etc. All these have a direct bearing on the prospect of increasing user charges in the long run. The body, for example, would be able to generate higher revenues through periodic revision of user-charges, if per capita income levels of its residents are high.

The rating agencies have, indeed, taken a medium or long-term view, as may be noted from the Rating

Reports of various public undertakings in the recent past. These have generally based their rating on a host of quantitative and qualitative factors, including those pertaining to the policy perspective at the state or local level and not simply a few measurable indicators.

4.6.3 Infrastructure Investment

Current Landscape

The Government of India realizes the importance of accelerating the investments in infrastructure to boost the country's slowing economy. Therefore, it has set a massive target for doubling investment in infrastructure from ₹27 lakh crores (eleventh plan – 2011/12 prices) to ₹51 lakh crores during the twelfth plan period, i.e., 2012–2017. The share of infrastructure investment in GDP is planned to be increased to more than 10% by the end of the twelfth plan. This investment, if it materializes, can propel India's economic growth to a higher trajectory.

It was not so long ago that infrastructure investment in India was financed almost entirely by the public sector—from government budgetary allocations and internal resources of public sector infrastructure companies.

However lately, the private sector has emerged as a significant player in bringing in investment and building and operating infrastructure assets from roads to ports and airports and to network industries such as telecom and power. Private investment now constitutes almost 40% per cent of infrastructure investment. In these times of tight fiscal environment, private sector will need to play a greater role without which infrastructure development will not meet the growing demand and could fall far behind the requirements.

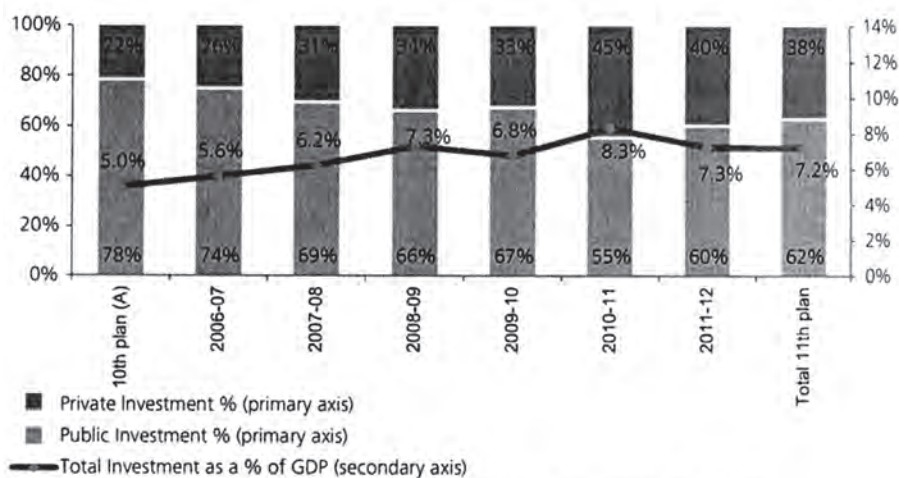
The pace of growth envisaged at 9 percent by planning commission can be achieved only if the infrastructure deficit is overcome and adequate investments are made. It is critical to bridge the gap between planned infrastructure spend and delivery.

Infrastructure investment in eleventh plan: Overview

In eleventh plan, a total investment of ₹27 lakh crores (eleventh plan – 2011/12 prices) was made towards infrastructure development. This investment at 7.22 percent of GDP (average) represents a significant shift from 5.02 percent of GDP (average) invested during tenth plan.¹

This sharp increase in total infrastructure investment was largely due to the rapid rise in investment by the private sector especially in power and telecommunications. (70% of the private sector investment was made in power and telecommunications.)

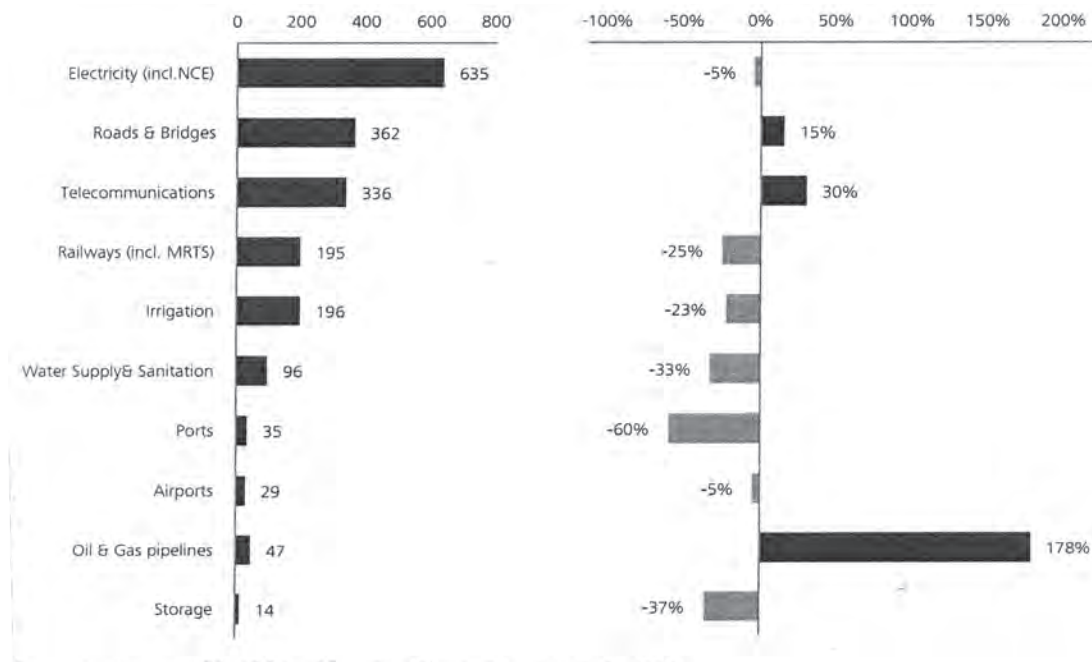
Total infrastructure investment breakup into public and private investment - 11th Five year plan(Actuals)



During eleventh plan, substantial private investment in telecom helped this sector over-achieve whereas a good mix of private and government funding gave oil & gas sector a massive push resulting in significant overachievement against targets. Power sector also saw a significant investment from private sector.

Ports, railways, storage and water supply sectors lagged behind in development and didn't meet their investment targets. There may be a greater need to enable private funding for these sectors to meet investment targets for next five year plan.

Total infrastructure investment Achieved across sectors for the eleventh five year plan



4.7 SEBI REGULATIONS RELATING TO INFRASTRUCTURE SECTOR

Infrastructure Debt Funds ('IDFs') were mooted in the budget speech of 2011- 2012 as notified special vehicles to attract foreign funds for financing infrastructure development projects. Accordingly, in order to augment and accelerate capital funding in the form of long term debts for government infrastructure projects and provide a framework for setting up and operating IDFs, the Securities and Exchange Board of India ('SEBI'), notified an amendment to the SEBI (Mutual Funds) Regulations, 1996 ('MF Regulations') on August 30, 2011 to include a new chapter VI-B. The Reserve Bank of India ('RBI') also notified broad parameters allowing banks and non-banking financial companies ('NBFCs') to set up IDFs on September 23, 2011 ('RBI Guidelines'). Therefore, the IDFs has the option to either operate under the trust route as mutual funds ('IDFs-MF') regulated by SEBI or corporate route as NBFCs ('IDFs-NBFC') regulated by RBI. On one hand SEBI has notified a detailed structure for operation of IDFs-MF. On the other, RBI Guidelines only lay down broad parameters allowing banks and NBFCs to be sponsors of SEBI regulated IDFs-MF, specifically highlighting that detailed guidelines for operation of IDFs-NBFC would be issued separately. This bulletin analysis the structure of IDFs notified under the MF Regulations and RBI Guidelines highlighting the impact on infrastructure funding in India.

(a) IDFs under MF Regulations

(i) Eligibility for launching an IDF Scheme

As per the MF Regulations, an existing mutual fund may launch an IDF Scheme if it has an adequate



number of key personnel having 'adequate experience' in the infrastructure sector. However, no parameters have been defined to measure adequacy of experience in the infrastructure sector. The MF Regulations further provide that an 'applicant' who wishes to launch 'only' IDF Schemes may be allowed to do so if the 'sponsor' or the parent company of the 'sponsor' has been (a) carrying on activities or business in infrastructure financing for a period of at least five years, and (b) fulfills a further eligibility criteria mentioned under regulation 7 of the MF Regulations.

(ii) Structure of IDF Scheme

An IDF Scheme can be either floated as a close-ended scheme with a minimum five year maturity period or as an open-ended scheme with a lock-in period of five years with 'interval periods' of less than a month. Units issued to investors under any of these schemes are required to be listed on a recognized stock exchange. The IDF Scheme must have a commitment of minimum INR 250 million from a minimum of five 'strategic investors.' Each 'strategic investor' is required to contribute a minimum of INR 10 million with no one holding more than 50% of the net assets of the IDF Scheme. Each unit issued must be of a minimum INR 1 million and can be partly paid at the time of issuance. The partly paid units can only be listed after being fully paid on subsequent capital calls.

Although mutual funds are supposed to mobilize participation from the general public, in light of the minimum investment size prescribed for each investor, it seems that IDFs would primarily cater to High Net-worth Individuals ("HNIs"). The structure notified under the MF Regulations looks similar to a private equity investment model with peculiarities like minimum investment limit and issuance of partly paid units to investors. For better monitoring SEBI has recently come out with draft SEBI (Alternative Investment Funds) Regulations, 2011, proposing to making it mandatory for all private pools of capital including debt funds and infrastructure equity funds to register with it. Keeping up with this trend, SEBI has tried to create a dedicated regime for debt funding of infrastructure sector through the inclusion of IDFs under the tighter mutual funds regulatory framework.

(iii) Permissible Investments

The MF Regulations mandate for investment of at least 90% of the net assets of the IDF Scheme in debt securities or securitized debt instruments of infrastructure companies. They can also invest in projects or special purpose vehicles that are specifically created for the purpose of facilitating or promoting investment in the infrastructure sector. SEBI has also allowed IDFs-MF to refinance bank loans for existing and revenue generating infrastructure projects. Till date, banks have been the main source of funding for these projects, but were unable to provide long-term funding given their asset-liability mismatch. Through refinancing of bank loans an equivalent volume of funds would be released for fresh lending to infrastructure projects. As a result, there would be a two-fold flow of funds for infrastructure development, one through the IDFs and other through banks.

The remaining 10% of net assets of IDFs are permitted to be invested in equity shares, convertibles including mezzanine financing instruments of both stock listed and unlisted companies engaged in infrastructure or related infrastructure development projects. Further, there is a cap of 30% of the net assets for investment in debt securities or assets of any single infrastructure company or project or bank loan given in respect of completed and revenue generating infrastructure projects. However, this limit can extend to 50% upon approval by board of trustees and the asset management company of the scheme. IDFs can invest up to a maximum of 25% of their net asset in listed securities of the "sponsor" or his associate/group company. Such investments are subject to a prior approval from trustees and a complete disclosure to investors in this regard.

(iv) Taxation of IDFs and valuation of their assets

Section 10(23D) of Income Tax Act, 1961 ("IT Act") provides for income tax exemption to SEBI registered mutual funds. Within the provisions of MF Regulations, IDFs are required to be set up as mutual funds and compulsorily register with SEBI. Thus, all incomes accruing to the IDF-MFs will be exempted from income tax. Furthermore, Section 10(35) of the IT Act also extends a similar exemption from income

tax to all incomes received in respect of units of a SEBI registered mutual fund. Thus, investors of an IDF Scheme will also be able to claim income tax exemption for returns received in respect of units held by them. MF Regulations mandate for a valuation "in good faith" by the asset management company of all the assets held by the IDF. This has to be done in conformity with the valuation principles approved by the trustees. The same is to be calculated and declared at least once in 90 days. Such frequent valuation seems to be onerous and will add to the administrative cost and expenses of the IDF.

(v) Disclosures in offer document and transaction by employees

On the lines of SEBI's mandate to protect the interest of investors, MF Regulations prescribe that the offer document of an IDF Scheme shall contain adequate disclosures to equip investors for making an informed investment decision. These regulations also make it mandatory for the employees/directors of the asset management company or the trustee company to make a disclosure of any transactions done with the investee companies within one month of completion of the transaction to the compliance officer. The post transaction one month long time period for disclosure is in line with a similar provision in case of real estate mutual fund scheme. The compliance officer is thereafter required to give a reasoned report to the trustees of the IDFs-MF on probable conflict of interest issues. Though the MF Regulations provide for a post-transaction disclosure, in our opinion, it is essential to make it mandatory for the interested director/employee to report to the compliance officer before the transaction is consummated, so that all conflict of interest issues can be discussed and addressed before hand.

(b) RBI Guidelines on IDFs

Any investments by banks and NBFCs in IDF Schemes will require a prior approval from the RBI. The RBI Guidelines prescribe various thresholds for investment in trust based IDFs by banks and NBFCs. Banks acting as sponsors to IDFs-MF will be subject to existing prudential limits on investments in financial services companies and their capital market exposure while NBFCs will need to have at least \$60 million as net-owned funds. Moreover, NBFCs are also required to be in existence for five years to invest in IDFs-MF, meaning thereby that start-up NBFCs would not be able to invest in trust based IDFs. Though detailed guidelines for IDFs-NBFC are still awaited, some of the key features enumerating from Finance Ministry's Press Release and RBI Guidelines are:

IDFs setting up as NBFC must have net-owned-funds of at least \$60 million and issue rupee or dollar denominated bonds of minimum 5 year maturity to investors;

They should be assigned a minimum credit rating 'A' or equivalent of CRISIL, FITCH, etc.;

They are only allowed to invest in Public Private Partnership ('PPP') projects and post-commercial operation date ('COD') infrastructure projects. Such projects should have been in satisfactory commercial operation for at least one year before any investment is made in them. They should also be party to a tripartite agreement with the concessionaire and the project authority for ensuring a compulsory buyout with termination payment. Normally, PPP projects have high risk associated with them. Once construction is complete it would substantially come down, improving the credit rating and ensuring long term debts from investors;

Income of IDFs-NBFC will be exempted from income tax and withholding tax on interest payments on the borrowings has been reduced from 20% to 5%;¹⁰

Potential investors would mainly include off-shore and domestic institutional investors, off-shore HNIs and NRIs. Insurance and Pension Funds are one of the key investors as they have long term resources, but would require regulatory approval before investing in IDFs. As per the current norms of Insurance Regulatory and Development Authority ('IRDA'), it is mandatory for insurance companies to direct 15% of their investment towards infrastructure. Moreover investment limits of Foreign institutional investors ('FIIs') for corporate bonds issued by infrastructure companies has been recently increased to \$25 billion¹² and investment limits in IDFs needs to be correspondingly changed to augment overseas fund flow.



India's Planning Commission has projected an investment of approximately INR 45 trillion for infrastructure development during the 12th Five Year Plan (2012-17). The proposed IDF regime would certainly be instrumental in mobilizing capital to meet this aspiring budget and deficits in the infrastructure sector. The government along with the regulators also aspires to accelerate the evolution of secondary market for both debts and bonds with the creation of institution of IDF. This garners much more prominence in the wake of the current upward interest rate regime in the country and considering that banks are also approaching their exposure limits. From the perspective of an investor, making investment in IDFs is a lucrative option as it would assure long term benefits and would guard to an extent against market sensitivities.

SEBI seems to have taken a short cut by establishing the institution of IDF within the current framework of mutual funds, and not establishing a separate and dedicated regime. However, it would ensure investors of tax benefits along with professional management and good governance of their capital. At the same time, it is imperative that RBI also comes out with detailed guidelines at the earliest, providing with definite contours for establishment of IDFs under the corporate route.

(c) SEBI (Issue of Capital and Disclosure Requirements) Regulations, 2009 (ICDR Regulations) relating to infrastructure companies/ sector

- (i) Rule 19(2)(b) of SCRR as modified in June 2010 requires all companies to offer and allot at least 25% (or 10% if the post issue capital of the company, calculated at offer price, is more than four thousand crore rupees) of each class or kind of equity shares or debentures convertible into equity shares issued by it to the public. The Rule, however, carves out an exemption only for public sector companies for whom the requirement is set at 10%. All other companies, irrespective of the sector, are expected to follow the Rule as amended.
- (ii) The CCI vide Gazette Notification dated March 28, 2012 issued a 'Harmonized Master List' of infrastructure sub-sectors for all regulators/authorities to follow. It was also stated therein that any agency supporting a sector/ sub-sector outside the list may continue to do so and the matter may be revisited after an appropriate time by the Institutional Mechanism. The Institutional Mechanism is chaired by the Secretary, Department of Economic Affairs, and its members include Member Secretary of Planning Commission, Secretary of Department of Revenue, Chief Economic Advisor of DEA, a Representative each of RBI, SEBI, IRDA and PFRDA and Secretary of the concerned Administrative Ministry/ Department.

(d) Harmonized Master List:

The following waivers are granted to Government companies in the infrastructure sector:

- (i) Specified securities can be offered for sale to public even if such securities have been held by the sellers for a period of less than 1 year. (Regulation 26(6) of SEBI (ICDR) Regulations). For other sectors, such securities need to be held for atleast one year.
- (ii) If the issue price per equity share is less than five hundred rupees, the face value of the equity shares need not be ten rupees per equity share. (Regulation 31 of SEBI (ICDR) Regulations).
- (iii) Specified securities acquired by promoters during the preceding one year at a price lower than the price at which specified securities are being offered to public in the initial public offer securities are eligible for promoter's contribution (Regulation 33(1)(b) of SEBI (ICDR) Regulations).

SEBI (ICDR) Regulations' definition of infrastructure sector is more exhaustive and includes some sectors which are not part of the 'Harmonized Master List', such as housing, mining & related activities, technology related infrastructure, manufacturing of components & materials or any other utilities or facilities required by infrastructure sector, environment related infrastructure, disaster management services, preservation of monuments & icons and emergency services. A comparison between the 'Harmonized Master List' as per Gazette Notification and Schedule X of SEBI (ICDR) Regulations.

As per the decision of the CCI, the 'Harmonized Master List' is meant to guide all the agencies

responsible for supporting infrastructure in various ways and each financing agency is free to spell out its reasons and draw its own list of sub-sectors out of the Master List that it intends to support, with adequate justification for inclusion / non inclusion of specific sub-sectors from the Master List. Further, the terms of reference of the Institutional Mechanism, as stated in the Gazette Notification, would be to update the Master List and to revisit the infrastructure sub-sectors outside the Master List which are presently being supported by any agency after an appropriate period of time.

Currently, there are no compelling reasons for SEBI to adopt the 'Harmonized Master List' which may result in discontinuing the benefits currently available to Government infrastructure companies falling within the SEBI list.

4.8 LEGAL FORM OF ORGANISATION

Provisions of the companies Act, 1956

Important definitions other than those covered under section 2

Section 4A of the companies Act, 1956 defines Public Financial Institutions —

1. Each of the financial institutions specified in this sub-section shall be regarded, for the purposes of this Act, as a public financial institution, namely —
 - (i) the Industrial Credit and Investment Corporation of India Limited, a company formed and registered under the Indian Companies Act, 1913 (7 of 1913);
 - (ii) **the Industrial Finance Corporation of India**, established under section 3 of the Industrial Finance Corporation Act, 1948 (15 of 1948);
 - (iii) the Industrial Development Bank of India, established under section 3 of the Industrial Development Bank of India Act, 1964 (18 of 1964);
 - (iv) the Life Insurance Corporation of India, established under section 3 of the Life Insurance Corporation Act, 1956 (31 of 1956);
 - (v) the Unit Trust of India, established under section 3 of the Unit Trust of India Act, 1963 (52 of 1963);
 - (vi) **the Infrastructure Development Finance Company Limited**, a company formed and registered under this Act.
2. Subject to the provisions of sub-section (1), the Central Government may, by notification in the Official Gazette, specify such other institution as it may think fit to be a public financial institution:

Provided that no institution shall be so specified unless —

 - i. it has been established or constituted by or under any Central Act, or
 - ii. not less than fifty-one per cent of the paid-up share capital of such institution is held or controlled by the Central Government.

Legal form of Infrastructure financing companies or Intermediaries or Institution

At the time of independence in 1947, India's capital market was relatively under-developed. Although there was significant demand for new capital, there was a dearth of providers. Merchant bankers and underwriting firms were almost non-existent. And commercial banks were not equipped to provide long-term industrial finance in any significant manner. By the early 1990s, it was recognized that there was need for greater flexibility to respond to the changing financial system. There was a need for these financial institutions to directly access the capital markets for their funds needs. So a number of infrastructure finance companies were set up. Some of them have become fully private like ICICI while others have been partly privatized, like REC and PFC. Besides a number of private companies have recently become big players in the infrastructure financing space like SREI, L&T Finance etc.



Legal form of some of Infrastructure companies involved in Infrastructure financing-

- (i) **Rural Electrification Corporation (REC)** - REC a listed Public Sector Enterprise Government of India with a net worth of ₹ 11,080 Crore as on March 2010. Its main objective is to finance and promote rural electrification projects all over the country. It provides financial assistance to State Electricity Boards, State Government Departments and Rural Electric Cooperatives for rural electrification projects as are sponsored by them. REC provides loan assistance to SEBs/State Power Utilities for investments in rural electrification schemes through its Corporate Office. The Project Offices in the States coordinate the programmes of REC's financing with the concerned SEBs/State Power Utilities and facilitate in formulation of schemes, loan sanction and disbursement and implementation of schemes by the concerned SEBs/State Power Utilities.
- (ii) **Infrastructure Development Financial Corporation (IDFC)** – is India's leading integrated infrastructure finance player providing end to end infrastructure financing and project implementation services. Their business can be broadly classified into Corporate investment banking (project finance, investment banking), alternative asset management (private & project equity), public market asset management (IDFC Mutual fund). The company provides financial intermediation for infrastructure projects and services, adding value through innovative products to the infrastructure value chain & asset maintenance of existing infrastructure projects. It focuses on supporting companies to get the best return on investments.
- (iii) **The Industrial Finance Corporation of India (IFCI)** - was founded in July 1948, as the first Development Financial Institution in the country to cater to the long-term finance needs of the industrial sector. The newly-established DFI was provided access to low-cost funds through the central bank's Statutory Liquidity Ratio which in turn enabled it to provide loans and advances to corporate borrowers at concessional rates. Until the establishment of ICICI in 1956 and IDBI in 1964, IFCI remained solely responsible for implementation of the government's industrial policy initiatives. It made a significant contribution to the modernization of Indian industry, export promotion, import substitution, pollution control, energy conservation and generation through commercially viable and market- friendly initiatives. Cumulatively, IFCI sanctioned financial assistance of Rs 462 billion to 5707 concerns and disbursed Rs 444 billion since its inception. In the process, IFCI catalysed investments worth Rs 2,526 billion in the industrial and infrastructure sectors.
- (iv) **Power Finance Corporation (PFC)** – is an Institution in financing for sustainable development of the Indian Power Sector and its linkages, with an eye on global operations. The total sanctions & disbursements for the year ended 2009-10 amounted to ₹ 65,466 crores & ₹ 25,808 crores respectively. The resources mobilized for the year ended Dec 2010 amounted to ₹ 764,465 million (source: <http://www.pfcindia.com/Content/LendingOperations.aspx>). The clientele consists of State Electricity Boards, State Power Utilities, State Electricity/Power Departments, Other State Departments engaged in the development of power projects, Central Power Utilities, Joint Sector Power Utilities, Equipment Manufacturers & Private Sector Power Utilities.
- (v) **Infrastructure Leasing & Financial Services Limited (IL&FS)** is one of India's leading infrastructure development and finance companies. IL&FS was promoted by the Central Bank of India (CBI), Housing Development Finance Corporation Limited (HDFC) and Unit Trust of India (UTI). Over the years, IL&FS has broad-based its shareholding and inducted Institutional shareholders including State Bank of India, Life Insurance Corporation of India, ORIX Corporation – Japan and Abu Dhabi Investment Authority. IL&FS has branched to become a leading player in venture capital, private equity, asset management, road building. It has a number of listed subsidiaries in the Indian stock market
- (vi) **India Infrastructure Finance Company Ltd (IIFCL)**
IIFCL was incorporated under the Companies Act as a wholly-owned Government of India company in January 2006 and commenced operations from April 2006 to provide long term finance to viable infrastructure projects through the Scheme for Financing Viable Infrastructure Projects through a Special Purpose Vehicle called India Infrastructure Finance Company Ltd

(IIFCL), broadly referred to as SIFTI. The sectors eligible for financial assistance from IIFCL are roads and highways, power, airport, port, urban infrastructure, cold storage, warehousing, fertilizer manufacturing etc. IIFCL accords overriding priority to Public-Private Partnership (PPP) Projects. The authorised & paid up capital of the company as on 30th June 2012 was Rs 5,000 crore and Rs 2,500 crores respectively.

(vii) Non-Banking Financial Companies

The Reserve Bank of India is entrusted with the responsibility of regulating and supervising the Non-Banking Financial Companies by virtue of powers vested in Chapter III B of the Reserve Bank of India Act, 1934.

A Non-Banking Financial Company (NBFC) is a company registered under the Companies Act, 1956 engaged in the business of loans and advances, acquisition of shares/ stocks/ bonds/ debentures/ securities issued by Government or local authority or other marketable securities of a like nature, leasing, hire-purchase, insurance business, chit business but does not include any institution whose principal business is that of agriculture activity, industrial activity, purchase or sale of any goods (other than securities) or providing any services and sale/ purchase/ construction of immovable property. A non-banking institution which is a company and has principal business of receiving deposits under any scheme or arrangement in one lump sum or in installments by way of contributions or in any other manner, is also a non-banking financial company (Residuary non-banking company).

Example of NBFC

- (i) **Infrastructure Finance Company (IFC)** : IFC is a non-banking finance company a) which deploys at least 75 per cent of its total assets in infrastructure loans, b) has a minimum Net Owned Funds of ₹ 300 crore, c) has a minimum credit rating of 'A 'or equivalent d) and a CRAR of 15%.
- (ii) **L&T Infrastructure Finance Company Limited (L&T Infra)**: L&T Infra, incorporated in 2006, is registered as an Non Banking Financial Company (NBFC) under the Reserve Bank of India (RBI) Act 1934, and is among the select few financial institutions classified as an Infrastructure Finance Company (IFC). Since 2011 it has been classified as a Public Finance Institution (PFI) by the Ministry of Corporate Affairs. It was set up with an initial capital of 500 crore (US\$111 million) and has expanded at a rapid rate since inception to reach an asset base of ~₹10,914 Cr (USD 1.9 bln) with a ₹ 259 Cr (USD 47 mln) of profit after tax in FY-12.
- (iii) **SREI INFRASTRUCTURE FINANCE LTD**: Srei Infrastructure Finance Ltd. is one of India's leading Non Banking Financial Institutions and the only private sector infrastructure financing NBFI. It commenced its operations in 1989 with the objective of actively participating in nation building process and was visionary in selecting Infrastructure sector as its principal growth area. Today, Srei has developed expertise in financing of infrastructure equipment (for construction, mining, oil & gas, power and others), infrastructure projects, infrastructure development and advisory in all verticals of infrastructure. As a result, Srei has come to be recognised for innovation of financial instruments and offering customised solutions in the infrastructure space.

SREI Infrastructure Finance Ltd (SREINF), is primarily into financing infrastructure equipment and projects as well as renewable energy projects. The company has 52 offices across India, and is a market leader in infrastructure equipment financing with 30% market share. Equipment finance forms a chunk of SREINF's portfolio (~90%); infrastructure project finance forms ~10%, while renewable energy financing makes up the rest. To further scale up its equipment financing and leasing business, the company entered into a 50:50 JV with BNP Paribas Lease Group (BPLG), which commenced operations in April 2008. Along with the above-mentioned financing businesses, SREINF undertakes other businesses through its wholly-owned subsidiaries. It is tapping emerging business opportunities in venture capital, asset management, investment banking, and insurance broking through its subsidiaries. SREINF also runs a fleet management business through Quippo, wherein it has 17% stake, to provide equipment on rental, primarily in the construction, mining, oil & gas, telecom, and energy spaces.

4.9 SOURCES OF INFRASTRUCTURE INVESTMENT IN INDIA

In first 3 years of eleventh plan, budgetary support constituted 45 per cent of the total infrastructure spending. The debt from Commercial banks, NBFCs, Insurance Companies and the external sources constituted 41 per cent of the funding while the balance 14 per cent was funded through Equity and FDI.

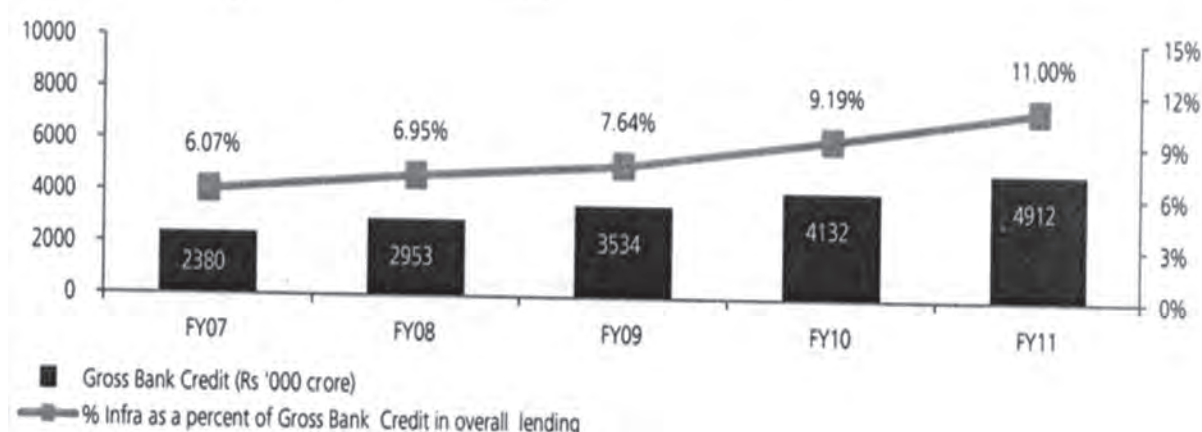
	Domestic	External Sources
Type	Domestic investors	Foreign investors
	Public Utilities	Equipment suppliers (in collaboration with domestic or international developers)
Equity	Dedicated Government Funds	Dedicated infrastructure funds
	Institutional investors	Other international equity investors
	Domestic Commercial banks (3- 5 year tenor)	International Commercial banks (7-10 year tenor)
	Domestic term lending institutions (7 -10 year tenor)	Export credit agencies (7 -10 year tenor)
Debt	Domestic bond markets (7 – 10 year tenor)	International Bond markets (10 - 30 year tenor)
	Specialized infrastructure financing options such as infrastructure debt funds	Multilateral agencies (With more than 20 year tenor)

Sources of private funding

(i) Banks

There has been a rapid growth in bank credit to infrastructure projects with banks contributing to the tune of 21% of the total investment during first 3 years of 11th five year plan.¹ Most of this funding has been provided by Public Sector banks and in some cases the sectoral prudential caps have almost been reached (especially for power sector) thus constraining any further lending to these sectors. Banks have prudential exposure caps for infrastructure sector lending as a whole as well as for individual sectors.

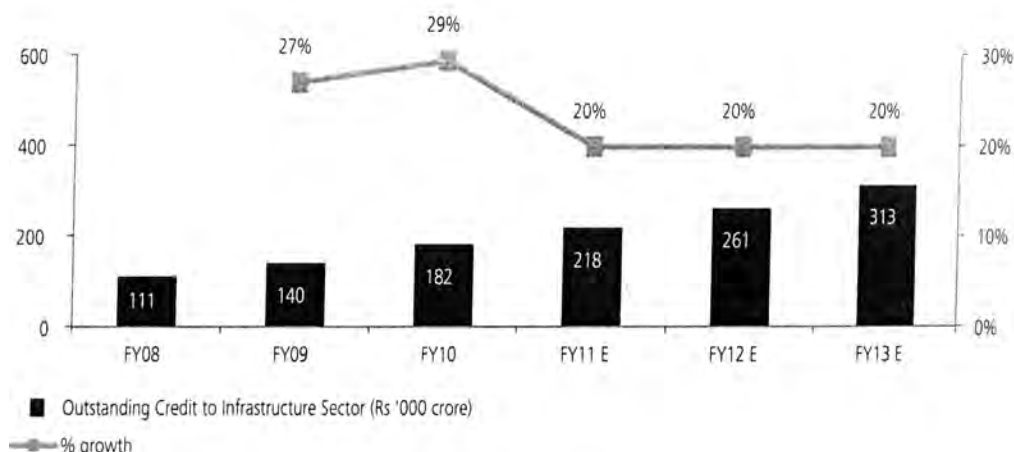
Bank Lending towards infrastructure investment



(ii) Non banking financial companies (NBFCs)

Over the eleventh plan period, NBFCs lending increased sharply primarily due to higher demand from power, telecom and roads sectors. Two major NBFCs, PFC and REC together constituted 80 per cent of the lending by NBFCs.

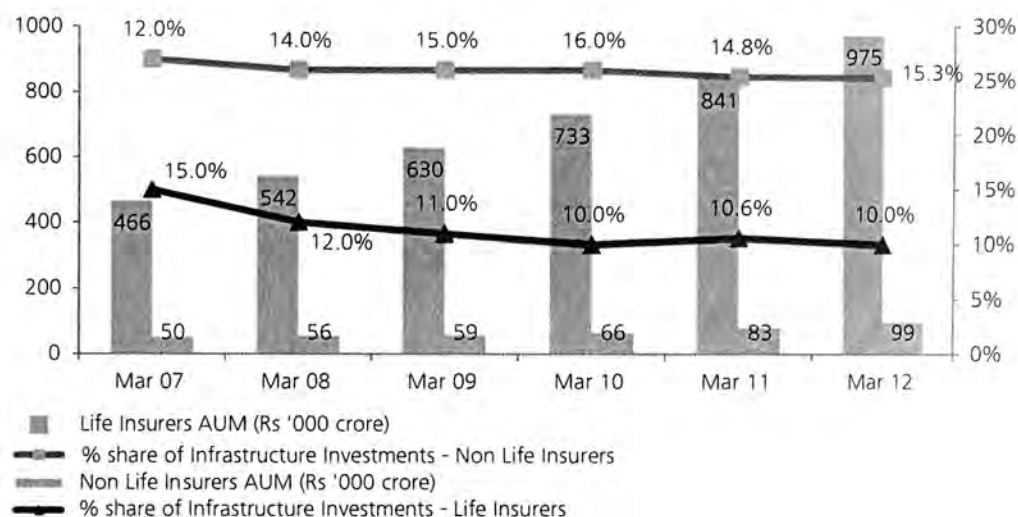
Growth registered by NBFCs towards infrastructure investment and NBFCs lending (actual and expected)



(iii) Life insurance Companies

Life insurance companies are required to invest at least 15% of their Life Fund in infrastructure and housing. Investment by insurance companies in 2012 has only been 10% of insurance life fund AUM which indicates further potential to utilize insurance companies to fund infrastructure development. Moreover insurance penetration is estimated to continue to rise, with the insurance premium expected to grow from the current approximate 4% of GDP to 6.4% of GDP by the end of the twelfth plan.¹ This will generate further potential for infrastructure funding however it will be subject to management of prudential and regulatory constraints in the sector.

infrastructure investment as a percentage of life fund and non- life fund

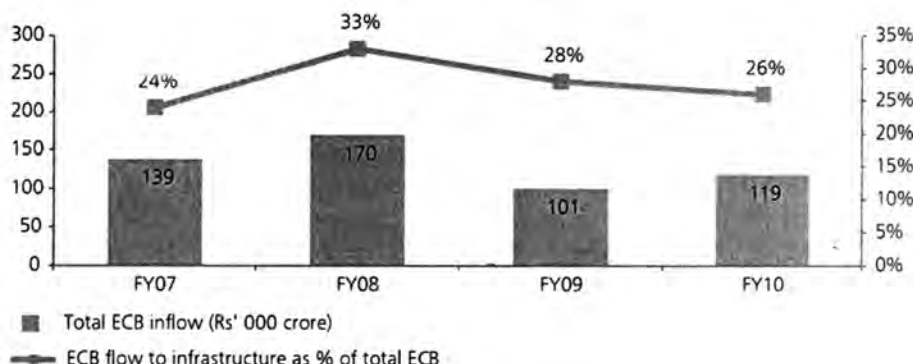


(iv) External commercial borrowings (ECB's)

The share of ECB in total infrastructure investments has been recording a decline. This could be a reflection of the way regulatory environment is viewed by the international investors. They are not keen on making

long term investments in environments which have regulatory idiosyncrasies. Under-developed financial markets/products may have also contributed to this drop in ECB funding.

Share of ECBs in total infrastructure investment



(v) Equity

A large part of equity investments relies on foreign investments with domestic investment institutions not showing significant interest in taking equity in Infrastructure projects. The equity investment for the twelfth plan period is estimated to be ₹4.56 lakh crores¹

4.10 FINANCIAL OBJECTIVE

(i) Objective of the Financing Public Private Partnerships

The objective of the Financing Public Private Partnerships (PPP) in Infrastructure through Support to India Infrastructure Finance Company Limited (IIFCL) Project is to increase the availability of long-term financing for infrastructure PPP projects. There are two components the project, the first component being long-term finance to infrastructure projects. This component will provide long-term funds to the IIFCL for on-lending to PPP-based infrastructure projects. The Bank team has carried out a pipeline review to identify projects eligible for financing through the International Bank for Reconstruction and Development (IBRD) loan. Based on the review, which was updated to factor in the impact of the recent global financial crisis on Indian infrastructure, the team believes that there will be a sufficient number of good sub-projects for the IIFCL to support through the proposed IBRD loan. The pipeline of sub-projects being considered includes selected power, roads, and ports projects. Finally, the second component is the capacity building. This component will include support for the two broad areas: a) strengthening IIFCL 's organizational needs in the following areas: i) strengthening and mainstreaming IIFCL environmental and social safeguards framework (ESSF) into its credit review process and post-sanction monitoring of sub-projects, ii) human resource strategy development and implementation, and iii) risk management and research support for IIFCL treasury; and b) implementing and monitoring the project: this will include support to the IIFCL for the day-to-day implementation of the project, covering all aspects of the operations manual (OM), including Financial Management (FM) monitoring and reporting; procurement; safeguards review; monitoring and implementation; overall results monitoring; and efforts to ensure governance accountability and transparency.

(ii) Objectives of the Takeout Finance Scheme

- To boost the availability of longer tenor debt finance for infrastructure projects.
- To address sectoral / group / entity exposure issues and asset-liability mismatch concerns of Lenders, who are providing debt financing to infrastructure projects.

- (c) To expand sources of finance for infrastructure projects by facilitating participation of new entities i.e. medium / small sized banks, insurance companies and pension funds.

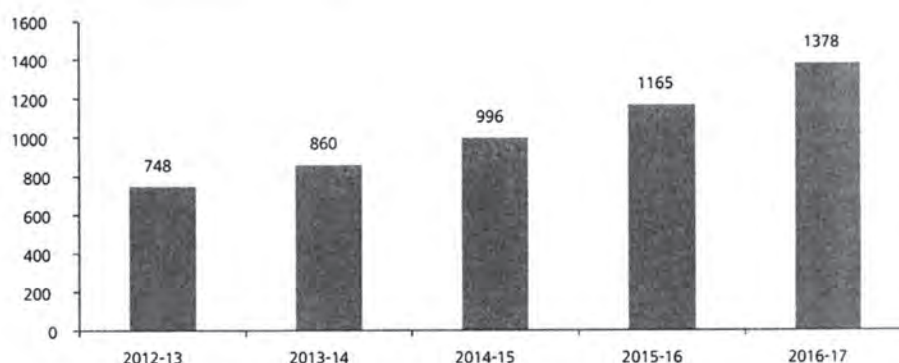
Projections for the twelfth plan period

Planning commission is targeting an investment of 51 lakh crores over the duration of the twelfth five year plan which is almost double the amount proposed under the eleventh plan. While the share of public investment is projected to decrease from 62% to a level of 53% in the twelfth plan, the share of private investment is projected to increase from 38% (eleventh plan) to 47% (twelfth plan) of the total investment.¹

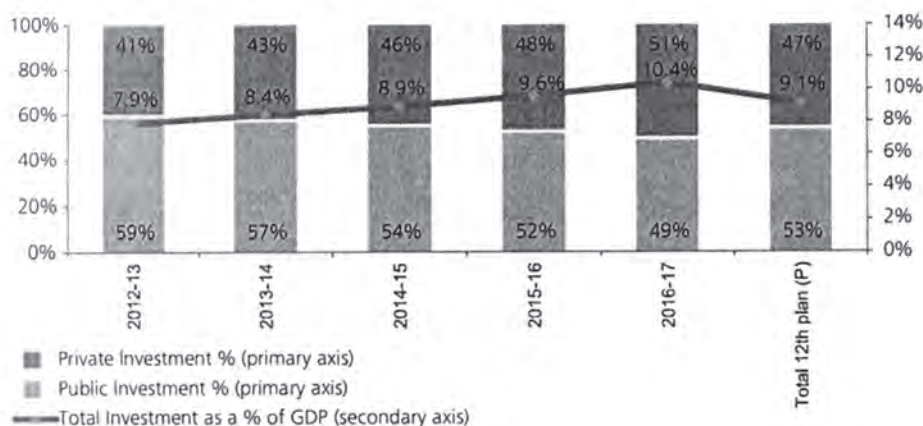
In comparison to eleventh plan, a very significant growth (>100%) in investments (Budgetary & Private) has been projected for Non-Conventional Energy, MRTS, Ports and Storage. All the other sectors are also projected to have an investment growth of > 50%.

Planning commission is expecting private sector to play a key role in twelfth plan with an overall investment growth of 131%. Private investment is projected to grow in all the infrastructure sectors with Railways, Water Supply, Storage and Ports projected to grow at >200% whereas investment in other sectors is projected to grow at >100%. Overall private sector investment will be a key to success of infrastructure development under twelfth five year plan.

Projections for investment in infrastructure for the twelfth plan

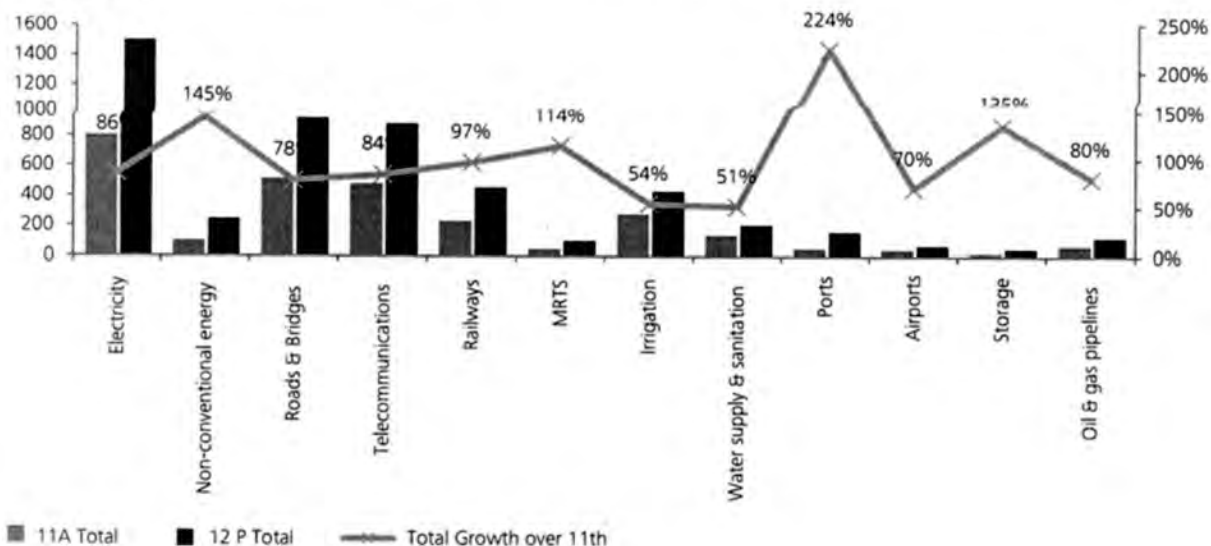


Total infrastructure investment breakup into public and private investment - 12th Five Year Plan (Projected)



Sector-wise infrastructure investment over 11th (Actual) & 12th plan (projections)

Exhibit 10: Sector-wise Infrastructure Investment over 11th (Actual) & 12th Plan (Projections)
('000 crores)



4.11 PROJECTED INVESTMENT IN THE INFRASTRUCTURE SECTOR DURING THE TWELFTH PLAN

To support the high economic growth, the investment requirements in the infrastructure sector is estimated to be around 41 lakh crore (revised to ₹ 45 lakh crore in the Approach paper for the Twelfth Plan) during the Twelfth plan period. This implies that infrastructure investment will need to increase from about 8.0 per cent of GDP in the base year (2011-12) of the Plan to about 10.0 per cent of GDP in 2016-17. Over the plan period as a whole, the infrastructure investment is estimated to be about 9.95 per cent of GDP. Financing of this investment would require larger outlays from the public sector, but this has to be coupled with a more than proportional rise in private investment. Going forward, the share of private investment in infrastructure may, in fact, have to increase to 50.0 per cent in the Twelfth Plan. However, this estimate on infrastructure investment has to be understood with caution as the underlying assumption is nine per cent growth in GDP throughout the plan period. But at any case, even with GDP growth of seven or eight per cent, if we want to invest around ten per cent of GDP in the infrastructure sector, the financing requirement is going to be huge (Table 2).

Table 2: Projected Investment in Infrastructure during the Twelfth Five Year Plan

(₹ crore at 2006-07 prices)						
	2012-13	2013-14	2014-15	2015-16	2016-17	Twelfth Plan
GDP	68,82,549	75,01,978	81,77,156	89,13,100	97,15,280	4,11,90,064
Rate of Growth of GDP	9.00	9.00	9.00	9.00	9.00	9.00
Infrastructure Investment as per cent of GDP	9.00	9.50	9.90	10.30	10.70	9.95
Infrastructure Investment	6,19,429	7,12,688	8,09,538	9,18,049	10,39,535	40,99,240

Source: Mid-Term Appraisal of the Eleventh Five Year Plan, Planning Commission.

Now the question is how do we finance it?

First, let us look at the broad pattern of financing of infrastructure in our country before highlighting some of the issues involved in it. According to the Planning Commission, during the first three years of Eleventh Five Year Plan, funds from the Central Government budget financed around 45 per cent of the total

investment in infrastructure. The remaining 55 per cent was divided between debt financing (41 per cent) and equity financing (14 per cent). It is noteworthy that within the debt financing, commercial banks alone financed around 21 per cent and another 10 per cent was financed by the NBFCs. Notably other sources of financing, such as, External Commercial Borrowings (ECBs), equity, FDI and insurance companies financed less than 10 per cent of the total infrastructure investment each.

Now, having seen the broad pattern of financing of infrastructure, the question is: whether this pattern sustainable in the long run. Or, to put it differently, what are the issues our country faces on this front?

4.12 INVESTMENT AND DIVIDEND DECISION

Corporate finance is the area of finance dealing with monetary decisions that business enterprises make and the tools and analysis used to make these decisions. The primary goal of corporate finance is to maximize shareholder value. Although it is in principle different from managerial finance which studies the financial decisions of all firms, rather than corporations alone, the main concepts in the study of corporate finance are applicable to the financial problems of all kinds of firms.

The discipline can be divided into long-term and short-term decisions and techniques. Capital investment decisions are long-term choices about which projects receive investment, whether to finance that investment with equity or debt, and when or whether to pay dividends to shareholders. On the other hand, short term decisions deal with the short-term balance of current assets and current liabilities; the focus here is on managing cash, inventories, and short-term borrowing and lending (such as the terms on credit extended to customers).

The terms corporate finance and corporate financier are also associated with investment banking. The typical role of an investment bank is to evaluate the company's financial needs and raise the appropriate type of capital that best fits those needs. Thus, the terms "corporate finance" and "corporate financier" may be associated with transactions in which capital is raised in order to create, develop, grow or acquire businesses.

Capital investment decisions

Capital investment decisions are long-term corporate finance decisions relating to fixed assets and capital structure. Decisions are based on several inter-related criteria. (1) Corporate management seeks to maximize the value of the firm by investing in projects which yield a positive net present value when valued using an appropriate discount rate in consideration of risk. (2) These projects must also be financed appropriately. (3) If no such opportunities exist, maximizing shareholder value dictates that management must return excess cash to shareholders (i.e., distribution via dividends). Capital investment decisions thus comprise an investment decision, a financing decision, and a dividend decision.

The investment decision

Management must allocate limited resources between competing opportunities (projects) in a process known as capital budgeting. Making this investment, or capital allocation, decision requires estimating the value of each opportunity or project, which is a function of the size, timing and predictability of future cash flows.

Project valuation

In general, each project's value will be estimated using a discounted cash flow (DCF) valuation, and the opportunity with the highest value, as measured by the resultant net present value (NPV) will be selected (applied to Corporate Finance by Joel Dean in 1951; see also Fisher separation theorem, John Burr Williams# Theory). This requires estimating the size and timing of all of the incremental cash flows resulting from the project. Such future cash flows are then discounted to determine their present value (see Time value of money). These present values are then summed, and this sum net of the initial investment outlay is the NPV.



The NPV is greatly affected by the discount rate. Thus, identifying the proper discount rate – often termed, the project “hurdle rate” – is critical to making an appropriate decision. The hurdle rate is the minimum acceptable return on an investment—i.e. the project appropriate discount rate. The hurdle rate should reflect the riskiness of the investment, typically measured by volatility of cash flows, and must take into account the project-relevant financing mix. Managers use models such as the CAPM or the APT to estimate a discount rate appropriate for a particular project, and use the weighted average cost of capital (WACC) to reflect the financing mix selected. (A common error in choosing a discount rate for a project is to apply a WACC that applies to the entire firm. Such an approach may not be appropriate where the risk of a particular project differs markedly from that of the firm's existing portfolio of assets.)

In conjunction with NPV, there are several other measures used as (secondary) selection criteria in corporate finance. These are visible from the DCF and include discounted payback period, IRR, Modified IRR, equivalent annuity, capital efficiency, and ROI. Alternatives (complements) to NPV include Residual Income Valuation, MVA / EVA (Joel Stern, Stern Stewart & Co) and APV (Stewart Myers).

Valuing flexibility

In many cases, for example R&D projects, a project may open (or close) various paths of action to the company, but this reality will not (typically) be captured in a strict NPV approach. Some analysts account for this uncertainty by adjusting the discount rate (e.g. by increasing the cost of capital) or the cash flows (using certainty equivalents, or applying (subjective) “haircuts” to the forecast numbers). Even when employed, however, these latter methods do not normally properly account for changes in risk over the project's lifecycle and hence fail to appropriately adapt the risk adjustment. Management will therefore (sometimes) employ tools which place an explicit value on these options. So, whereas in a DCF valuation the most likely or average or scenario specific cash flows are discounted, here the “flexible and staged nature” of the investment is modelled, and hence ‘all’ potential payoffs are considered. The difference between the two valuations is the “value of flexibility” inherent in the project.

The two most common tools are Decision Tree Analysis (DTA) and Real options valuation (ROV); they may often be used interchangeably:

- DTA values flexibility by incorporating possible events (or states) and consequent management decisions. (For example, a company would build a factory given that demand for its product exceeded a certain level during the pilot-phase, and outsource production otherwise. In turn, given further demand, it would similarly expand the factory, and maintain it otherwise. In a DCF model, by contrast, there is no “branching” – each scenario must be modelled separately.) In the decision tree, each management decision in response to an “event” generates a “branch” or “path” which the company could follow; the probabilities of each event are determined or specified by management. Once the tree is constructed: (1) “all” possible events and their resultant paths are visible to management; (2) given this “knowledge” of the events that could follow, and assuming rational decision making, management chooses the branches (i.e. actions) corresponding to the highest value path probability weighted; (3) this path is then taken as representative of project value. See Decision theory# Choice under uncertainty.
- ROV is usually used when the value of a project is contingent on the value of some other asset or underlying variable. (For example, the viability of a mining project is contingent on the price of gold; if the price is too low, management will abandon the mining rights, if sufficiently high, management will develop the ore body. Again, a DCF valuation would capture only one of these outcomes.) Here: (1) using financial option theory as a framework, the decision to be taken is identified as corresponding to either a call option or a put option; (2) an appropriate valuation technique is then employed – usually a variant on the Binomial options model or a bespoke simulation model, while Black Scholes type formulae are used less often; see Contingent claim valuation. (3) The “true” value of the project is then the NPV of the “most likely” scenario plus the option value. (Real options in corporate finance were first discussed by Stewart Myers in 1977; viewing corporate strategy as a series of options was originally per Timothy Luehrman, in the late 1990s.) See also Option pricing approaches under Business valuation.

Quantifying

Further information: Sensitivity analysis, Scenario planning, and Monte Carlo methods in finance

Given the uncertainty inherent in project forecasting and valuation, analysts will wish to assess the sensitivity of project NPV to the various inputs (i.e. assumptions) to the DCF model. In a typical sensitivity analysis the analyst will vary one key factor while holding all other inputs constant, *ceteris paribus*. The sensitivity of NPV to a change in that factor is then observed, and is calculated as a "slope": $\Delta \text{NPV} / \Delta \text{factor}$. For example, the analyst will determine NPV at various growth rates in annual revenue as specified (usually at set increments, e.g. -10%, -5%, 0%, 5%....), and then determine the sensitivity using this formula. Often, several variables may be of interest, and their various combinations produce a "value-surface", (or even a "value-space"), where NPV is then a function of several variables. See also Stress testing.

Using a related technique, analysts also run scenario based forecasts of NPV. Here, a scenario comprises a particular outcome for economy-wide, "global" factors (demand for the product, exchange rates, commodity prices, etc...) as well as for company-specific factors (unit costs, etc...). As an example, the analyst may specify various revenue growth scenarios (e.g. 0% for "Worst Case", 10% for "Likely Case" and 20% for "Best Case"), where all key inputs are adjusted so as to be consistent with the growth assumptions, and calculate the NPV for each. Note that for scenario based analysis, the various combinations of inputs must be internally consistent (see discussion at Financial modeling), whereas for the sensitivity approach these need not be so. An application of this methodology is to determine an "unbiased" NPV, where management determines a (subjective) probability for each scenario – the NPV for the project is then the probability-weighted average of the various scenarios. See First Chicago Method.

A further advancement which "overcomes the limitations of sensitivity and scenario analyses by examining the effects of all possible combinations of variables and their realizations." is to construct stochastic or probabilistic financial models – as opposed to the traditional static and deterministic models as above. For this purpose, the most common method is to use Monte Carlo simulation to analyze the project's NPV. This method was introduced to finance by David B. Hertz in 1964, although has only recently become widespread. (Risk-analysis add-ins, such as @Risk or Crystal Ball, allow analysts to run simulations in spreadsheet based DCF models, whereas before these, some knowledge of programming was required.). Here, the cash flow components that are (heavily) impacted by uncertainty are simulated, mathematically reflecting their "random characteristics". In contrast to the scenario approach above, the simulation produces several thousand random but possible outcomes, or trials, "covering all conceivable real world contingencies in proportion to their likelihood;" see Monte Carlo Simulation versus "What If" Scenarios. The output is then a histogram of project NPV, and the average NPV of the potential investment – as well as its volatility and other sensitivities – is then observed. This histogram provides information not visible from the static DCF: for example, it allows for an estimate of the probability that a project has a net present value greater than zero (or any other value).

Continuing the above example; instead of assigning three discrete values to revenue growth, and to the other relevant variables, the analyst would assign an appropriate probability distribution to each variable (commonly triangular or beta), and, where possible, specify the observed or supposed correlation between the variables. These distributions would then be "sampled" repeatedly –incorporating this correlation – so as to generate several thousand random but possible scenarios, with corresponding valuations, which are then used to generate the NPV histogram. The resultant statistics (average NPV and standard deviation of NPV) will be a more accurate mirror of the project's "randomness" than the variance observed under the scenario based approach. These are often used as estimates of the underlying "spot price" and volatility for the real option valuation as above; see Real options valuation: Valuation inputs. A more robust Monte Carlo model would include the possible occurrence of risk events (e.g., a credit crunch) that drive variations in one or more of the DCF model inputs.



The financing decision

Achieving the goals of corporate finance requires that any corporate investment be financed appropriately. The sources of financing are, generically, capital self-generated by the firm and capital from external funders, obtained by issuing new debt and equity (and hybrid- or convertible securities). As above, since both hurdle rate and cash flows (and hence the riskiness of the firm) will be affected, the financing mix will impact the valuation of the firm (as well as the other long-term financial management decisions). There are two interrelated considerations here:

- Management must identify the "optimal mix" of financing—the capital structure that results in maximum firm value. (See Balance sheet, WACC, Fisher separation theorem; but, see also the Modigliani-Miller theorem.) Financing a project through debt results in a liability or obligation that must be serviced, thus entailing cash flow implications independent of the project's degree of success. Equity financing is less risky with respect to cash flow commitments, but results in a dilution of share ownership, control and earnings. The cost of equity (see CAPM and APT) is also typically higher than the cost of debt - which is, additionally, a deductible expense - and so equity financing may result in an increased hurdle rate which may offset any reduction in cash flow risk.
- Management must attempt to match the long-term financing mix to the assets being financed as closely as possible, in terms of both timing and cash flows. Managing any potential asset liability mismatch or duration gap entails matching the assets and liabilities respectively according to maturity pattern ("Cashflow matching") or duration ("immunization"); managing this relationship in the short-term is a major function of working capital management, as discussed below. Other techniques, such as securitization, or hedging using interest rate- or credit derivatives, are also common. See Asset liability management; Treasury management; Credit risk; Interest rate risk.

Much of the theory here, falls under the umbrella of the Trade-Off Theory in which firms are assumed to trade-off the tax benefits of debt with the bankruptcy costs of debt when making their decisions. However economists have developed a set of alternative theories about financing decisions. One of the main alternative theories of how firms make their financing decisions is the Pecking Order Theory (Stewart Myers), which suggests that firms avoid external financing while they have internal financing available and avoid new equity financing while they can engage in new debt financing at reasonably low interest rates. Also, Capital structure substitution theory hypothesizes that management manipulates the capital structure such that earnings per share (EPS) are maximized. An emerging area in finance theory is right-financing whereby investment banks and corporations can enhance investment return and company value over time by determining the right investment objectives, policy framework, institutional structure, source of financing (debt or equity) and expenditure framework within a given economy and under given market conditions. One of the more recent innovations in this are from a theoretical point of view is the Market timing hypothesis. This hypothesis, inspired in the behavioral finance literature, states that firms look for the cheaper type of financing regardless of their current levels of internal resources, debt and equity.

The dividend decision

Whether to issue dividends, and what amount, is calculated mainly on the basis of the company's unappropriated profit and its earning prospects for the coming year. The amount is also often calculated based on expected free cash flows i.e. cash remaining after all business expenses, and capital investment needs have been met.

If there are no NPV positive opportunities, i.e. projects where returns exceed the hurdle rate, then – finance theory suggests – management must return excess cash to shareholders as dividends. This is the general case, however there are exceptions. For example, shareholders of a "growth stock", expect that the company will, almost by definition, retain earnings so as to fund growth internally. In other cases, even though an opportunity is currently NPV negative, management may consider "investment flexibility" / potential payoffs and decide to retain cash flows; see above and Real options.

Management must also decide on the form of the dividend distribution, generally as cash dividends or

via a share buyback. Various factors may be taken into consideration: where shareholders must pay tax on dividends, firms may elect to retain earnings or to perform a stock buyback, in both cases increasing the value of shares outstanding. Alternatively, some companies will pay “dividends” from stock rather than in cash; see Corporate action. Today, it is generally accepted that dividend policy is value neutral – i.e. the value of the firm would be the same, whether it issued cash dividends or repurchased its stock (see Modigliani-Miller theorem).

Working capital management

Decisions relating to working capital and short term financing are referred to as working capital management. These involve managing the relationship between a firm's short-term assets and its short-term liabilities. In general this is as follows: As above, the goal of Corporate Finance is the maximization of firm value. In the context of long term, capital investment decisions, firm value is enhanced through appropriately selecting and funding NPV positive investments. These investments, in turn, have implications in terms of cash flow and cost of capital. The goal of Working Capital (i.e. short term) management is therefore to ensure that the firm is able to operate, and that it has sufficient cash flow to service long term debt, and to satisfy both maturing short-term debt and upcoming operational expenses. In so doing, firm value is enhanced when, and if, the return on capital exceeds the cost of capital; See Economic value added (EVA). Managing short term finance and long term finance is one task of a modern CFO.

Decision criteria

Working capital is the amount of capital which is readily available to an organization. That is, working capital is the difference between resources in cash or readily convertible into cash (Current Assets), and cash requirements (Current Liabilities). As a result, the decisions relating to working capital are always current, i.e. short term, decisions. In addition to time horizon, working capital decisions differ from capital investment decisions in terms of discounting and profitability considerations; they are also “reversible” to some extent. (Considerations as to Risk appetite and return targets remain identical, although some constraints – such as those imposed by loan covenants – may be more relevant here).

Working capital management decisions are therefore not taken on the same basis as long term decisions, and working capital management applies different criteria in decision making: the main considerations are (1) cash flow / liquidity and (2) profitability / return on capital (of which cash flow is probably the most important).

- The most widely used measure of cash flow is the net operating cycle, or cash conversion cycle. This represents the time difference between cash payment for raw materials and cash collection for sales. The cash conversion cycle indicates the firm's ability to convert its resources into cash. Because this number effectively corresponds to the time that the firm's cash is tied up in operations and unavailable for other activities, management generally aims at a low net count. (Another measure is gross operating cycle which is the same as net operating cycle except that it does not take into account the creditors deferral period.)
- In this context, the most useful measure of profitability is Return on capital (ROC). The result is shown as a percentage, determined by dividing relevant income for the 12 months by capital employed; Return on equity (ROE) shows this result for the firm's shareholders. As above, firm value is enhanced when, and if, the return on capital, exceeds the cost of capital. ROC measures are therefore useful as a management tool, in that they link short-term policy with long-term decision making.

Management of working capital

Guided by the above criteria, management will use a combination of policies and techniques for the management of working capital. These policies aim at managing the current assets (generally cash and cash equivalents, inventories and debtors) and the short term financing, such that cash flows and returns are acceptable.



- **Cash management.** Identify the cash balance which allows for the business to meet day to day expenses, but reduces cash holding costs.
- **Inventory management.** Identify the level of inventory which allows for uninterrupted production but reduces the investment in raw materials – and minimizes reordering costs – and hence increases cash flow. Note that “inventory” is usually the realm of operations management; given the potential impact on cash flow, and on the balance sheet in general, finance typically “gets involved in an oversight or policing way”. See Supply chain management; Just In Time (JIT); Economic order quantity (EOQ); Dynamic lot size model; Economic production quantity (EPQ); Economic Lot Scheduling Problem; Inventory control problem; Safety stock.
- **Debtors management.** There are two inter-related roles here: Identify the appropriate credit policy, i.e. credit terms which will attract customers, such that any impact on cash flows and the cash conversion cycle will be offset by increased revenue and hence Return on Capital (or vice versa); see Discounts and allowances. Implement appropriate Credit scoring policies and techniques such that the risk of default on any new business is acceptable given these criteria.
- **Short term financing.** Identify the appropriate source of financing, given the cash conversion cycle: the inventory is ideally financed by credit granted by the supplier; however, it may be necessary to utilize a bank loan (or overdraft), or to “convert debtors to cash” through “factoring”.

4.13 THE INTEREST RATES HAVE BEEN RECENTLY REVISED BY THE BOARD

Financing Pattern w.e.f. 01-05-2013

For Housing / Infrastructure Project Loans and Take-out Finance (except Hudco Niwas individual home loan)

Sl. No.	Category	Extent of Max. Finance Upto (%)*	Reference Rate (RR)	= 10.25%
			Rol= RR (+/-) **Floating Rate	Rol= RR (+/-) ***Fixed Rate
I	HOUSING PROJECTS			
	1. EWS Housing by all borrowers (sanctioned on or after 24.08.2009)	90		
	i) Housing Projects for Widows, SC/ST/OBC, physically handicapped, Single woman above 35 years of age and natural calamities affected areas.		-2.25% (8.00%)	-1.25% (9.00%)
	ii) Others including schemes benefiting EWS family and action plan Projects		-2.00%	-1.00% (9.25%)
	2. LIG Housing Projects by all borrowers (sanctioned on or after 24.08.2009)	As per Guidelines	-1.75% (8.50%)	- 0.75% (9.50%)
	3. EWS Housing by all borrowers (sanctioned before 24.08.09)	90		
	i) Housing Projects for Widows, SC/STs, physically handicapped, Single woman above 35 years of age and natural calamities affected areas.		-1.25% (9.00%)	+ 0.0% (10.25%)##

	ii) Others including schemes benefiting EWS family and action plan Projects		-1.00% (9.25%)	+0.25% (10.50%) ##
	4. LIG Housing Projects by all borrowers (sanctioned before 24.08.09)		- 0.75% (9.50%)	+0.50% (10.75%) ##
	5. All other Housing covering MIG, HIG, Rental, etc. by Govt. and Public Agencies		+ 0.00% (10.25%)	+1.00% (11.25%)
	6. Land Acquisition by Government and Public sector agencies for Housing purpose		+ 0.00% (10.25%)	+1.00% (11.25%)
II	INFRASTRUCTURE PROJECTS by Government/Public Agencies			
	1. Core Infrastructure covering Water Supply, Sewerage, Drainage, Solid Waste Management, Urban/City Roads, Social Infrastructure		+ 0.00% (10.25%)	+1.00% (11.25%)
	2. All other Infrastructure other than Core Infrastructure (as in II-1), excluding Power Projects		+0.25% (10.50%)	+1.25% (11.50%)
	3. State Govt. PSUs/ State Govt. Agencies for Power Projects			
	i) Standalone / Co-financing		+1.50% (11.75%)	+2.50% (12.75%)
	ii) Consortium Projects		As per lead lender rate or rate as given at II-3(i) above, whichever is higher.	
	iii) Land Acquisition by Government and Public sector agencies for all power projects		+1.50% (11.75%)	+2.50% (12.75%)
	4. Metro Rail Projects \$:			
	i) With Equity Participation by Govt. of India		+0.25% (10.50%)	+1.25% (11.50%)
	ii) All other metro projects other than (4-i) above		+0.50% (10.75%)	+1.50% (11.75%)
	5. Land Acquisition by Government and Public sector agencies for all other purposes (other than power projects) such as for industrial development, SEZ development, etc.		+0.25% (10.50%)	+1.25% (11.50%)
	6. Integrated Township Development Schemes		+ 0.00% (10.25%)	+1.00% (11.25%)
III	Central PSUs \$			
	1. Maha-ratna/ Nava-Ratna CPSUs \$			
	i) Direct Borrowings for all Projects		+ 0.00% (10.25%)	+1.00% (11.25%)
	ii) SPVs/Subsidiaries/JVs of Maha-ratna/ Nava-Ratna CPSUs with more than 50%		+0.25% (10.50%)	+1.25% (11.50%)



	iii) SPVs/Subsidiaries/JVs of Maha-ratna/ Nava- Ratna CPSUs with Equity of Maha-ratna/ Nava-Ratna being more than 26% ,subject to the total equity held by Govt/Public agencies being more than 50%		+1.00% (11.25%)	2.00% (12.25%)
	1. Mini-ratna CPSUs \$			
	i) Housing & Core Infrastructure (Direct Borrowing)		+0.25% (10.50%)	+1.25% (11.50%)
	ii) All Projects (other than Housing & Core Infrastructure) including Power, etc. (Direct Borrowing)		+1.25% (11.50%)	+2.25% (12.50%)
	IV. OTHER BORROWERS			
	1. Power sector Consortium projects from Private Sector		+2.50% (12.75%) or Consortium leader, whichever is higher (except PFC/REC, in which case HUDCO would follow the lead lenders rate subject to the rate not being less than the highest interest rate charged by HUDCO for Govt. projects)	+3.50% (13.75%)
	2. i) Private Sector Transport Projects incl. Roads & Ports, Airport, etc. (Non-Consortium)@@		+2.50% (12.75%)	+3.50% (13.75%)
	ii) Private Sector Transport Projects incl. Roads, Ports, Airport, etc. on Annuity Basis (Non-Consortium)@@		+2.25% (12.50%)	+3.25% (13.50%)
	ii) Consortium projects of Transport sector from Private Sector, incl. Roads & Ports@@		+1.00% (11.25%) or the lead lenders rate, whichever is higher. In any case, the applicable lending rate under this category will not be less than the applicable highest rate for Government sector Non-power sector projects.	+2.00% (12.25%)
	3. i) Joint Venture /SPV projects with 50% share of State Government/ Central Government /Central profit making PSUs	70	+2.25% (12.50%)	+3.25% (13.50%)
	ii) Joint Venture /SPV with 26% or more but Projects less than 50% share of State Government/ Central Government /Central profit making PSUs	70	+2.75% (13.00%)	+3.75% (14.00%)
	4. Other borrowers@	70		
	i) Not rated			
	a) Residential		+4.25% (14.50%)	+5.25% (15.50%)

	b) Real Estate Projects (i.e. Malls, Market Complex, Office Complex, IT Parks, Hotels, Resorts, Entertainment, SEZ, SPA, Health Club, Wellness Centres constructed along with multiplexes)		+5.25% (15.50%)	+6.25% (16.50%)
	c) Exclusive hotel projects and projects where Government extends duty concession / exemption such as SEZ (approved by the Government)		+4.75% (15.00%)	+5.75% (16.00%)
	b) Private Sector Consortium financed projects (other than power and real estate-Commercial and residential)		+2.50% or consortium leader rate, whichever is higher	+3.50% or consortium leader rate, whichever is higher
	ii) Rated Private Companies		A fixed rebate of 0.25 per cent shall be applicable to rated private sector agencies ('AA' and above or equivalent rating by SEBI and RBI registered Credit Rating Agencies) on their eligible fixed or floating base rate as per the option of the borrower. Private sector agencies rated as 'A' and above but below 'AA' or equivalent rating by SEBI and RBI registered Credit Rating Agencies would get a reduction in the interest rate by 0.15 per cent. Agencies rated as 'BBB' and above but below 'A' or equivalent rating by SEBI and RBI registered Credit Rating Agencies would get a reduction in the interest rate by 0.10 per cent. Subject to borrower maintaining the specified rating during entire tenure of loan. However, the rebate in interest rate as per specified norms shall be available during the validity of rating i.e., from the date of rating or date of release of loan whichever is later, and upto validity of rating. The borrower shall also submit annual rating before end of each financial year. Further, in case of subsequent downgrading of rating below the specified rating or non-submission of annual rating before end of financial year, interest rates applicable to 'Not rated' borrowers shall become applicable from first day of next billing date for the period rating remains downgraded/not submitted.	
	iii) Financing of affordable housing projects by private developers/builders reintroduced. For new projects under this category, interest rates are as follows			



	Sale Price of the Dwelling Unit up to ₹ 4.25 lakh		HUDCO's EWS/LIG interest rates	
	Sale Price of the Dwelling Unit above ₹4.25 lakh and upto ₹ 12 lakh		12.75%	13.75%
	Sale Price of the Dwelling Unit above ₹12 lakh and upto ₹ 25 lakh		13.75%	14.75%
	Sale Price of the Dwelling Unit is above ₹25 lakh		14.50%	15.50%
	For already sanctioned schemes (prior to 15/7/2011), the interest rate would be as per RMC A No. 14/DF/2011 dated 28th June 2011, maintaining the spread as per current reference rate (i.e. 10.25%)			
	iv) Co-operative Group Housing Societies			
	(a) Government Sector agencies		Applicable interest rate under Govt. Sector	
	(b) Private Sector agencies		+3.50% (13.75%)	+4.50% (14.75%)
	INTEREST RATE REBATES AVAILABLE FOR ALL LOANS			
	Loan secured by Bank guarantee alone			0.25

State Government borrowings/ rated Government agencies ('AA' & above or equivalent rating by SEBI and RBI registered Credit Rating Agencies) would get a reduction in the interest rate by 0.25 per cent. Agencies rated as '**A' and above but below 'AA'**' or equivalent rating by SEBI and RBI registered Credit Rating Agencies, a fixed rebate would get a reduction in the interest rate by 0.15 per cent. Agencies rated as '**BBB'and above but below 'A'**' or equivalent rating by SEBI and RBI registered Credit Rating Agencies, a fixed rebate would get a reduction in the interest rate by 0.10 per cent. This is subject to borrower maintaining the specified rating during entire tenure of loan. However, the rebate in interest rate as per specified norms shall be available during the validity of rating i.e., from the date of rating or date of release of loan whichever is later, and upto validity of rating. The borrower shall also submit annual rating before end of each financial year. Further, in case of subsequent downgrading of rating below the specified rating or non-submission of annual rating before end of financial year, interest rates applicable to 'Not rated' borrowers shall become applicable from first day of next billing date for the period rating remains downgraded/not submitted.

- @ For Real Estate Housing & Commercial Consortium Projects for private sector, the rate of interest will be the applicable rate for private sector housing and commercial sectors.
- \$ For Government Sector Consortium financed projects, where HUDCO is the lead lender, the rate of interest will be the applicable rate of interest of HUDCO. If HUDCO is not the lead lender, the applicable rate of interest will be either HUDCO rate of interest or consortium lead lender's rate, whichever is higher.
- * Extent of Finance is maximum available. However, actual loan will be based on Debt Equity Ratio, Means of Financing as per DPR, extent of security requirement or Maximum Extent of Finance, whichever is less.
- ** HUDCO reserves the right to review and revise the Floating Rate including the factor of plus (+)/minus(−) over the reference rate for each category.
- *** Loan sanctioned/released at fixed rate (FR) shall be automatically reset upon expiry of every 3/5 years at then prevailing fixed rate (FR) to make the revision in interest to be effective from the date on which the respective releases complete 3/5 years, i.e. from the date of release plus 3/5 years respectively. Necessary provision in the agreement will be necessary stating that "Borrower is

agreeable for automatic reset upon expiry of 3 years at then applicable fixed rates (FR) and shall execute a supplementary agreement to this effect in case of resetting of loan on fixed rates (FR) as per this circular. However, borrowers are given an option to prepay the loan without prepayment charges after 3 years as an alternative to automatic reset."

- @ @ The projects should be undertaken through competitive bidding and should be duly approved by NHAI/State Highway Authority/DEA, Ministry of Finance/Maritime Board/Tariff Authority for Major Ports, etc. as the case may be.
- # # The fixed rates for a particular Category would be 1.00% more than the floating rates under the same Category, except Categories under **I-3 (i & ii) and I-4**, where the fixed rate is 1.25% more than the floating rate.
- Base Rate for existing Consortium schemes sanctioned prior to removal of Base rate system is as follows:

Category	Base Rate from 01.10.2012
EWS/LIG Housing by all borrowers	14.00%
Govt. Sector Borrowing / PSU's etc	14.50%
Govt. Sector Borrowing /PSU's -Power projects	13.75%
Other Borrowers	14.50%

4.14 ISSUES IN INFRASTRUCTURE FINANCING

(i) Funding Gap

Funding Gap is the most important issue that we face on this front. According to the estimates made by the Planning Commission in March 2010, after taking into account the recent trends in different sources of infrastructure financing, the funding gap in the infrastructure sector during the last two years of the Eleventh Five Year Plan is likely to be ₹1,27,570 crore, which is around 18 per cent of the total estimated requirement (Table 3). The slowdown in the economy experienced after March 2010 has further aggravated this funding gap in the infrastructure sector during the Eleventh Plan. More recently, in the context of Eurozone debt crisis, accessing external resources by way of ECBs could also become difficult and this would also accentuate the funding gap.

Table 3: Funding Gap in Infrastructure Finance during 2010-11 and 2011-12

(₹crore)			
Source of Funds	Estimated Requirement*	Estimated Availability#	Funding Gap
Commercial Banks	2,67,480	2,02,027	1,25,685
NBFCs@	1,24,699	1,00,651	
Insurance Companies	52,046	42,330	
ECBs	76,984	50,515	
Total Debt Funds	5,21,208	3,95,523	
Equity\$	1,86,456	1,84,571	1,885
Total	7,07,664	5,80,094	1,27,570

As per existing pattern, # As per trends.@ Including IIFCL. \$ Including FDI. Source: Planning Commission (2010), Conference on 'Building Infrastructure: Challenges and Opportunities – Financing of Infrastructure', March 2010.



(ii) Fiscal Burden

We have already seen that almost half of the total investment in the infrastructure sector was done by the Government through budget allocations. Here the point to be noted is that Government funds have competing demands, such as, education, health, employment generation, among others. Given that there is a limit to the Government's financing of infrastructure, especially in the context of a rule based fiscal policy framework, it is important to explore other avenues for financing infrastructure.

(iii) Asset-Liability Mismatch of Commercial Banks

After the budgetary support, next in line for financing infrastructure were funds from the commercial banking sector. However, it is a well known fact that these are institutions that primarily leverage on short-term liabilities and, as such, their ability to extend long-term loans to the infrastructure sector is limited. This is because, by doing so they get into serious asset-liability mismatches.

(iv) Takeout financing

Takeout financing offers a window to the banks to free their balance sheet from exposure to infrastructure loans, lend to new projects and also enable better management of the asset liability position. In other words, takeout financing enables financing longer term projects with medium term funds. However, due to several factors the mechanism has not really emerged as a game-changer. One plausible reason is that the model does not envisage equitable distribution of risks and benefits. One of the oft repeated arguments is that banks assume credit and liquidity risk since the inception of the project but once the project is economically viable, taking out of the loan results in loss of opportunity of earning returns on seasoned loans. Further, if the original lenders/bankers are required to part with their security interest fully their residual exposure would be sub-ordinated to the interest of the take out financier.

(v) Investment Obligations of Insurance and Pension Funds

From the point of view of asset-liability mismatches, insurance and pension funds are one of the best suited institutions to invest in the infrastructure sector. This is because, in contrast to the commercial banking sector, these institutions leverage on long-term liabilities. However, they are constrained by their obligation to invest a substantial portion of their funds in Government securities. Of course, in a way, this facilitates the financing of gross fiscal deficit of the Central Government and hence enables the Central Government to make more investments. However, this limits the direct investment of these institutions in the infrastructure sector.

Capital market based on published statistical data

The main sources of information which is used in capital market are

- (i) Published Annual financial Statements;
- (ii) Published quarterly, half yearly report;
- (iii) Published information on IPO, buy-back of shares;
- (iv) Announcement of Dividends;
- (v) Changes of the management of the Company;
- (vi) Legal cases against the company (Holding or Subsidiary);
- (vii) Acquisition of share of the subsidiary company;
- (viii) Decision or acquiring the share of the subsidiary company;
- (ix) Issues of share to the promoter of the company as per required provision of the Act;
- (x) Announcement for
- (xi) Announcement for new project planning of the company;

- (xii) Foreign collaboration agreement;
- (xii) Announcement of new projects, expansion of existing project;
- (xiii) Amalgamation, Merger, acquisition or reconstruction of the company;
- (xiv) Report of Credit rating agencies;
- (xv) Announcement of the name of black listed companies from banks;
- (xvi) High court order for Liquidation of the company;
- (xvii) Order of Bankruptcy against the companies etc.,

Financial reporting and disclosure are potentially important means for management to communicate firm performance and governance to outside investors. Capital market intermediaries provide a framework for analyzing managers' reporting and disclosure decisions in a capital markets setting.

Based on the published data, investors can analyse the performance of the firm and viability of their investment decisions.

Corporate disclosure is critical for the functioning of an efficient capital market. Firms provide disclosure through regulated financial reports, including the financial statements, notes, management discussion and analysis, and other regulatory filings. In addition, some firms engage in voluntary communication, such as management forecasts, analysts' presentations and conference calls, corporate social responsibilities and other corporate reports. Financial reporting and voluntary disclosure of information by management, summarize key research findings and identify areas for future work. The credibility of management disclosures is enhanced by regulators, auditors and other capital market intermediaries.

Much of this research documents that earnings, book values, and other required financial statement information is "value relevant". However, fundamental questions about the demand for, and effectiveness of financial reporting and disclosure regulation in the economy remain unanswered.

There is evidence that financial analysts generate valuable new information through their earnings forecasts and stock recommendations. However, there are systematic biases in financial analysts' outputs, potentially arising from the conflicting incentives that they face. While theory suggests that auditors enhance the credibility of financial reports, empirical research has provided surprisingly little evidence to substantiate it.

4.15 NEED FOR AN EFFICIENT AND VIBRANT CORPORATE BOND MARKET

India has traditionally been a bank-dominated financial system with corporates raising resources through loan route/public deposits/FCCBs or private placements. This is probably due to a combination of factors, such as, banks find loan financing convenient as they do not have to mark to market loans in contrast to bonds, absence of a robust bankruptcy law, limited investor base, limited number of issuers, etc. This however, does not undermine the need for developing an efficient and vibrant corporate bond market in general, and for infrastructure financing, in particular. An active corporate bond market can facilitate long-term funding for the infrastructure sector. However, despite the various initiatives taken by the Reserve Bank, Securities & Exchange Board of India and Government of India, the corporate bond market is still a long way to go in providing adequate financing to the infrastructure sector in India.

Developing Municipal Bond Market for Financing Urban Infrastructure

For large scale financing urban infrastructure which is assuming critical importance in the context of rapid urbanization, conventional fiscal transfers to the urban local bodies or municipalities from governments are no longer considered sufficient. There have been some earnest experimentations by these bodies to tap unconventional methods of financing such as public private partnerships, utilizing urban assets



more productively, accessing carbon credits, etc. but then these do not address the financing needs. One possible way of addressing the problem is developing a municipal bond market. Today, the size of the market is insignificant and distributed among a few municipals of Ahmedabad, Nashik and some around Bangalore. Given the fact that the credit ratings for the municipalities of the 63 Jawahar Nehru National Urban Renewal Mission (JNURM) cities are regularly released and quite a few of them are rated as investment grade, we need to provide them avenues to tap the markets. Absence of the secondary market for the municipal bonds, problems relating to rating of bonds, accounting practices followed by the municipal bodies, adequacy of user charges for generating cash flows for servicing of bonds, availability of escrow mechanism are some of the issues which require to be addressed to encourage investments.

Insufficiency of User Charges

It is a well known fact that a large part of the infrastructure sector in India (especially irrigation, water supply, urban sanitation, and state road transport) is not amenable to commercialisation for various reasons, such as, regulatory, political and legal constraints in the real sector. Due to this, Government is not in a position to levy sufficient user charges on these services. The insufficiency of user charges on infrastructure projects negatively affect the servicing of the infrastructure loans. Generally, such loans are taken on a non-recourse basis and are highly dependent on cash flows. Hence, levy and collection of appropriate user charges becomes essential for financial viability of the projects.

Legal and Procedural Issues

As mentioned earlier, infrastructure development involves long gestation periods, and also many legal and procedural issues. The problems related to infrastructure development range from those relating to land acquisition for the infrastructure project to environmental clearances for the project. Many a times there are legal issues involved in it and these increase procedural delays. The added uncertainty due to these factors affects the risk appetite of investors as well as banks to extend funds for the development of infrastructure.

Given the various issues in financing infrastructure, it is important to glance through what we have already done for facilitating fund flow to the sector. This will help us in understanding what more can be done. In fact, it is important to note that both the Central Government and the Reserve Bank of India have taken a lot of measures to facilitate fund flow to this sector especially during the recent years.

4.16 MEASURES TAKEN BY THE CENTRAL GOVERNMENT

(i) Public-Private Partnership Projects in Infrastructure

As Government faces a tight budget constraint in the context of a rule based fiscal policy framework, it was important to encourage the private sector to invest more in the infrastructure sector. Resultantly, the Government started encouraging Public-Private Partnership (PPP) projects in the infrastructure sector. PPP mechanism provides built in credit enhancement for improving project viability by way of buyback guarantee, escrow arrangement, substitution rights for the lenders, etc. Government has taken several initiatives, especially to standardize the documents and process for structuring and award of PPP projects. This has improved transparency in relation to the issues involved in setting up PPP projects.

(ii) Setting up of various Committees to Simplify the Procedures

Recently Government has set up many committees to facilitate more private funding into the infrastructure sector. These include Committee on Infrastructure, Cabinet Committee on Infrastructure, PPP Appraisal Committee and Empowered Committee among others. These were mainly aimed at streamlining the policies to ensure time bound creation of infrastructure and to develop an institutional framework that would facilitate more flow of funds to the infrastructure sector.

(iii) Viability Gap Funding

Viability gap funding was introduced in 2006, which provides Central Government grants up to 20 per cent of the total capital cost to PPP projects undertaken by any central ministry, state government, statutory entity, or local body. The scheme aimed at providing upfront capital grant to PPP projects to enable financing of commercially unviable projects. The level of grant is the net present value of the gap between the project cost and estimated revenue generation over the concession period based on a user fee that was to be levied in a pre-determined manner.

(iv) Foreign Direct Investment and Infrastructure Development

To facilitate infrastructure financing 100 per cent FDI is allowed under the automatic route in some of the sectors such as mining, power, civil aviation sector, construction and development projects, industrial parks, petroleum and natural gas sector, telecommunications and special economic zones. Further, FDI is also allowed through the Government approval route in some sectors such as civil aviation sector, (Domestic Airlines (beyond 49 per cent), Existing airports (beyond 74 per cent to 100 per cent)); investing companies in infrastructure/services sector (except telecom); Petroleum and Natural Gas sector – refining PSU companies; Telecommunications – Basic and Cellular Services (beyond 49 per cent to 74 per cent), ISP with gateways, radio paging, end-to-end bandwidth (beyond 49 per cent to 74 per cent, ISP without gateway (beyond 49 per cent); Satellites (up to 74 per cent) and, mining and mineral separation of titanium bearing minerals and ores (100 per cent).

(v) Setting up of India Infrastructure Finance Company Limited (IIFCL)

Another major development was the setting up of IIFCL by the Central Government for providing long-term loans to the infrastructure projects. IIFCL is involved both in direct lending to project companies and refinancing of banks and other financial institutions. IIFCL can provide funds to the infrastructure project up to 20 per cent of the total project cost as long-term debt. Recently, IIFCL has come up with modifications to its takeout finance scheme, which will make the infrastructure loans cheaper. Further, IIFCL has decided to go for a transparent and competitive pricing for its takeout financing to ensure fair treatment to all participants. With this change, all developers irrespective of their size will get same treatment from the IIFCL depending on the rating of the project.

(vi) Relaxation in take-out financing scheme of IIFCL

The pricing mechanism of the recently announced takeout finance scheme of IIFCL is now based on credit rating of the project and is declared upfront. The rules related to timing of the takeout have also been changed. While for road projects the takeout can take place after commercial operation date (COD), for other sectors it has been relaxed to six months. Under existing norms, takeout financing can only be done one year after the scheduled COD of the project. Another notable change is that the developer can now approach for take out financing unlike earlier scheme where only the banks could exercise such an option. Further, lenders, instead of paying commission to IIFCL, would now be compensated upto a certain percentage of interest gain accruing to the borrower under the take-out finance scheme. Besides, interest rates to be charged by IIFCL have now become non-discretionary and transparent.

(vii) Setting up of Infrastructure Debt Funds

In the Union Budget for 2011-12, the Union Finance Minister announced the setting up of Infrastructure Debt Funds (IDFs) to accelerate the flow of long-term funds to the infrastructure projects. Accordingly, in November 2011, Reserve Bank of India and the Securities and Exchange Board of India (SEBI) notified detailed guidelines for setting up of IDFs which can either be a mutual fund (trusts) (IDF-MF) or an NBFC (companies) (IDF-NBFC). The Scheduled commercial banks are allowed to act as sponsors to IDF-MFs and IDF-NBFCs with prior approval from RBI subject to certain terms and conditions. Further, to attract off-shore funds into IDFs, Government of India is contemplating the reduction of withholding tax on interest payments on the borrowings by the IDFs from 20 per cent to 5 per cent. Income of the IDFs is also expected to be exempt from income tax. The IDF-NBFC can raise resources through issue of either



rupee or dollar denominated bonds of minimum five year maturity. IDFs are expected to channelize funds from insurance companies, pension funds and other long term sources into infrastructure sector. This will provide an alternative source of foreign currency funds for the infrastructure projects. However, certain dimensions need to be kept in mind while assessing the success of the model. Infrastructure financing presents quite a few challenges viz., little tangible security, high debt equity ratio, long implementation and repayment periods, etc. Banks and financial institutions have over the years gained experience and expertise in assessing and pricing these risks. IDFs are likely to face severe challenges on these issues. Therefore, these Funds have been allowed to invest only in PPP and post commencement operations date (COD) infrastructure projects which have completed at least one year of satisfactory commercial operations. Of course, IDF-MFs can also be set up in respect of non-PPP projects under higher risk-return framework. If a bank has a mutual fund, then it can float an infrastructure debt fund, mop up resources from investors, including private equity and strategic investors, and invest the proceeds in the equity of infrastructure projects. Thus, IDFs could be game changers in the way infrastructure projects are being financed.

(viii) Tapping the retail investor base through Infrastructure Bonds

To provide further impetus to infrastructure financing, Government of India has permitted IFCI, IDFC, LIC and infrastructure finance firms to issue long-term infrastructure bonds providing for tax benefit of up to ₹ 20,000 in the year of investment, under the Income Tax Act. The tax-free status has been granted by the government to these bonds issued only by designated financial institutions. By introduction of such instruments, the retail base can be tapped for raising funds for infrastructure projects. Of the proposed ₹ 30,000 crore funds to be raised, National Highway Authority of India (NHAI) & the Railway Finance Corporation are raising ₹ 10,000 crore each and HUDCO another ₹ 5,000 crore.

(ix) Major steps taken by the Reserve Bank

The Reserve Bank has initiated a number of regulatory measures/concessions for facilitating increased flow of credit to infrastructure projects. A briefly touch upon, few of the critical measures taken in this regard.

(a) Use of Foreign Exchange Reserves for Infrastructure Development

In India, the increase in quantum of foreign exchange reserves during the decade of 2000, coupled with escalating infrastructure constraints and the related financing deficit led to a debate on possibility of using foreign exchange reserves for investment in infrastructure sector. Although use of reserves for such purposes does not meet the criterion of reserve management objectives, a special and limited window has been created. Accordingly, IIFC (UK) Ltd. was incorporated in London and was set up in April 2008. Under this scheme, RBI invests, in tranches, up to an aggregate amount of USD 5 billion in fully government guaranteed foreign currency denominated bonds issued by this overseas Special Purpose Vehicles (SPV) of the IIFCL. The funds, thus raised, are to be utilized by the company for on-lending to the Indian companies implementing infrastructure projects in India and/or to co-finance the ECBs of such projects for capital expenditure outside India without creating any monetary impact.

(b) Enhanced Exposure norms

In view of the generally large requirements of funds for infrastructure projects, the existing RBI guidelines provide for enhanced exposure ceilings for the infrastructure lending. The credit exposure ceiling limits are 15 per cent of capital funds in case of a single borrower and 40 per cent of capital funds in the case of a borrower group. Credit exposure to a single borrower may exceed the exposure norm of 15 per cent of the bank's capital funds by an additional 5 per cent (i.e., **up to 20 per cent**) and a borrower group may exceed the exposure norm by an additional 10 per cent (i.e., **up to 50 per cent**), provided the additional credit exposure is on account of extension of credit to infrastructure projects.

(c) Asset-Liability Management in the context of Infrastructure Financing

In order to meet long term financing requirements of infrastructure projects and address asset liability management issue, banks are permitted to enter into take out financing arrangement with IDFC/other

Fls. Further, banks have also been allowed to issue long term bonds with a minimum maturity of five years to the extent of their exposure of residual maturity of more than five years to the infrastructure sector.

(d) Issuance of Guarantee

Keeping in view the special features of lending to infrastructure projects, viz., high degree of appraisal skills on the part of lenders and availability of resources of a maturity matching with the project period, banks are permitted to issue guarantees favouring other lending institutions in respect of infrastructure projects provided the bank issuing the guarantee takes a funded share in the project at least to the extent of five per cent of the project cost and undertakes normal credit appraisal, monitoring and follow up of the project.

(e) Financing Promoters' Equity

Banks have been permitted to extend finance for funding promoter's equity in cases where the proposal involves acquisition of share in an existing company engaged in implementing or operating an infrastructure project in India, subject to certain conditions.

(f) Relaxation from Capital Market Exposure

In order to encourage lending by banks to the infrastructure, the promoters' shares in the SPV of an infrastructure project pledged to the lending bank is permitted to be excluded from the banks' capital market exposure.

(g) Permission to invest in Unrated Bonds

In order to encourage banks to increase the flow of credit to infrastructure sector, banks are allowed to invest in unrated bonds of companies engaged in infrastructure activities within the ceiling of 10 per cent for unlisted non SLR securities.

(h) Relaxation in the Classification of Investments

Investment by banks in the long-term bonds issued by companies engaged in executing infrastructure projects and having a minimum residual maturity of seven years are allowed to be classified under the HTM category, which means they need not be marked to market.

(i) Relaxations relating to asset classification

With effect from March 31, 2008, the infrastructure project accounts of banks were permitted to be classified as sub-standard if the date of commencement of commercial production extended beyond a period of two years (as against 6 months in the case of other projects) after the date of completion of the project, as originally envisaged. With effect from March 31, 2010, if an infrastructure project loan classified as 'standard asset' is restructured any time during the above period of two years, it can be retained as a standard asset if the fresh date of commencement of operations is fixed within certain limits prescribed by the Reserve Bank, and provided the account continues to be serviced as per the restructured terms.

Certain relaxations as far as conditions specified for deriving asset classification benefits under our restructuring guidelines are made in respect of infrastructure exposure of banks i.e. **in respect of repayment period of restructured advances and regarding tangible security.**

(j) Infrastructure Debt Funds

Realizing the potential of Infrastructure Debt Funds in enhancing financing to the sector, Reserve Bank of India has, as a special case, permitted several prudential relaxations. Sponsor bank of IDF-NBFC has been permitted to contribute upto 49 per cent of the equity.

In order to enable and encourage higher quantum of take out financing by an IDF-NBFC, they have been permitted to take-on upto 50 per cent of its capital fund for individual projects. An additional exposure of 10 per cent can be taken subject to the approval of the Board. On a case to case basis, Reserve



Bank will permit such entities for additional exposures of another 15 per cent, subject to conditions. Thus, exposure can go up to 75 per cent of the capital funds.

Another significant relaxation is that for the purpose of computing capital adequacy of the IDF-NBFC, bonds covering PPP and post COD projects in existence over a year of commercial operation shall be assigned a lower risk weight of 50 percent.

Under the extant provisions of Foreign Exchange Management Act, (FEMA) 1999, Reserve Bank has allowed investment on repatriation basis by new class of eligible non-resident investors (viz. SWFs, multilateral agencies, pension funds, insurance funds, endowment funds) in Rupee and Foreign Currency denominated bonds issued by IDF-NBFCs and Rupee denominated units issued by IDF-MFs set up as SEBI registered Mutual Funds. IDFs would in turn lend to infrastructure projects as intermediaries. Further, SEBI registered FII, HNIs registered with SEBI and NRIs have also been allowed to invest in Rupee denominated bonds issued by the IDF-NBFCs and Rupee denominated units issued by IDF-MFs set up as SEBI registered domestic Mutual Funds. The original maturity of all the securities at the time of first investments by such investors shall be five years and the investments would be subject to a lock in period of three years. All such investments (excluding those by NRIs) will however be within an overall cap of US\$ 10 billion (which would be within the overall cap of USD 25 billion for FII investment in infrastructure debt).

(k) Other Relaxations

Banks are permitted to treat annuities under build-operate-transfer (BOT) model in respect of road/highway projects and toll collection rights, where there are provisions to compensate the project sponsor if a certain level of traffic is not achieved, as tangible securities subject to the condition that banks' right to receive annuities and toll collection rights is legally enforceable and irrevocable.

In view of certain safeguards, such as, escrow accounts available in respect of infrastructure lending, unsecured sub standard infrastructure loan accounts which are classified as sub-standard will attract a lower provisioning of 15 per cent (20 per cent with effect from May 18, 2011). To avail of this benefit of lower provisioning, the banks should have in place an appropriate mechanism to escrow the cash flows and also have a clear and legal first claim on these cash flows.

Banks can finance SPVs, registered under the Companies Act, set up for financing infrastructure projects on ensuring that these loans/investments are not used for financing the budget of State Governments.

(x) Introduction of Credit Default Swaps

Further, the introduction of Credit Default Swaps (CDS) would help banks to manage exposures while increasing credit penetration, and lending to infrastructure and large firms without being constrained by the extant regulatory prescriptions in respect of single borrower gross exposure limits. With effect from November 30, 2011, the Reserve Bank of India has also permitted CDS on unlisted but rated bonds of infrastructure companies and unlisted/unrated bonds issued by the SPVs set up by infrastructure companies. While introducing the CDS, which caused considerable regulatory concern during global financial crisis in 2008-09, a calibrated approach has been followed, focusing on product safety and systemic stability issues. The intention was to introduce a plain vanilla CDS which is easily understood by the market. CDS has been designed to limit excessive leverage and build-up in risk positions and at the same time ensures credit risk mitigation. Therefore, users are not allowed to buy 'naked' CDS, i.e., **buying credit protection without underlying risk exposures. In order to restrict the users from holding naked CDS positions; physical delivery is mandated in case of credit events. Transparency in the CDS market which was major concern in other markets during the financial crisis, would be ensured through mandatory reporting of trades by market makers on the CDS trade reporting platform coupled with periodic dissemination of information by the trade repository to the market and also to the regulators. These measures are going to provide fillip to bonds issued by infrastructure companies.**

(xi) Securitisation

To facilitate healthy securitisation of loans, the Reserve Bank issued guidelines on Securitisation of

Standard Assets which are applicable to all categories of loans including infrastructure loans. The circular contained various guidelines on true sale criteria, credit enhancement, Policy on provision of credit enhancement facilities, provision of liquidity facilities, provision of underwriting facilities, provision of services, prudential norms for investment in securities issued by SPVs, accounting treatment of the securitisation transactions, disclosures to be made, among others. Subsequently, keeping in mind the lessons learnt from the financial crisis that struck the developed economies, international developments in regulation of securitisation market and our review of existing regulatory norms on booking of profit on transfer of assets, reset of credit enhancements and transactions involving transfer of loans through direct assignment, the Reserve Bank of India has released a draft circular on 'Revisions to the Guidelines on Securitisation Transactions' to public comments on September 27, 2011.

The objective of the draft guidelines is to discourage the 'originate to distribute' business model in which loans were originated with the sole intention of immediate securitisation and securitisation of tranches of project loans even before the total disbursement is complete, thereby passing on the project implementation risk to investors. The draft introduced norms on Minimum Holding Period, Minimum Retention Ratio, prohibition of securitisation of single loans, loan origination standards, standards of due diligence, among others. It is expected that introduction of these norms would result in development of an orderly and healthy securitisation market and ensure greater alignment of the interests of the originators and the investors.

As a result of the above measures initiated by the Reserve Bank, scheduled commercial banks' exposure to infrastructure sector has shown a steady increasing trend over the years. Infrastructure credit as a percentage of bank credit has thus improved from 3.61 per cent as at end-March 2003 to 13.36 per cent as at end-March 2011.

(xii) Corporate Bond Market

Reserve Bank has issued guidelines on repo in corporate bonds to make the market more active. Further, all entities regulated by Reserve Bank of India are reporting corporate trades on FIMMDA developed platform, enabling greater transparency and thereby facilitating better price discovery. To ensure smooth settlement in the secondary market, RBI has permitted clearing houses of the exchanges to have a funds account with RBI to facilitate Delivery versus Payments (DvP-I) based settlement of trades. Primary dealers have been permitted higher exposure limits for corporates to enable better market making. As mentioned above, CDS on corporate bonds has been introduced to facilitate hedging of credit risk associated with holding of corporate bonds. Other measures, including permitting banks to classify investments in non-SLR bonds issued by companies engaged in infrastructure activities and having a minimum residual maturity of seven years under the HTM category and investment in non-SLR debt securities which are proposed to be listed as investment in listed securities are expected to provide fillip to the market.

In fact, as a result of these measures, trading volumes in corporate bonds have increased many-fold from ₹ 1,45,828 crore in 2008-09 to ₹ 5,98,604 crore in 2010-11.

Even as we have been following calibrated approach to opening of debt market to foreign investors, a separate limit of USD 25 billion has been provided for investment by FIIs in corporate bonds issued by infrastructure companies with a three year lock-in period. The investments under this route can either be through mutual fund debt schemes (for Qualified Foreign Investors with a limit of USD three billion) or through investment in bonds issued by infrastructure companies with a lock-in period of one year within investment limit of USD five billion and with a lock in period of three years with an investment limit of USD 17 billion.

(xiii) Liberalisation & Rationalization of ECB policies

Corporates implementing infrastructure projects were eligible to avail of ECB up to USD 500 million in a financial year under the automatic route. This limit has been raised to USD 750 million. Infrastructure Finance Companies (IFCs) i.e., Non Banking Financial Companies (NBFCs) categorized as IFCs by the Reserve Bank, are permitted to avail of ECBs, including the outstanding ECBs, up to 50 per cent of their



owned funds, for on-lending to the infrastructure sector as defined under the ECB policy, subject to their complying with certain conditions.

The Reserve Bank has further liberalized the ECB policy relating to the infrastructure sector in September 2011. Under this dispensation, the direct foreign equity holder (holding minimum 25 per cent of the paid-up capital) and indirect foreign equity holder holding at least 51 per cent of the paid-up capital will be permitted to provide credit enhancement for the domestic debt raised by Indian companies engaged exclusively in the development of infrastructure and infrastructure finance companies without prior approval from the Reserve Bank.

Further, considering the specific needs of the infrastructure sector, the existing ECB policy has been reviewed to allow Indian companies which are in the infrastructure sector to import capital goods by availing of short-term credit in the nature of 'bridge finance' subject to certain conditions.

Although refinancing of Rupee loan by ECB is generally not permitted, Indian companies in the infrastructure sector have now been allowed to utilize 25 per cent of the fresh ECB raised by them towards refinancing of the Rupee loan/s availed of by them from the domestic banking system, under the approval route, subject to certain conditions specified by the Reserve Bank.

Considering their specific needs, Indian companies which are in the infrastructure sector have now been allowed to avail of ECB in Renminbi, under the approval route, subject to an annual cap of US Dollar one billion.

(xiv) Making the Infrastructure Project Commercially Viable

This is the first and foremost thing we should do for financing infrastructure in a sustainable manner. As mentioned earlier infrastructure projects involve huge financing requirements, most of which are met by banks and other financial institutions directly and indirectly. Thus, it is very important to make the project commercially viable to ensure regular servicing of the loan. This will lead to sustainable development of infrastructure without jeopardizing the soundness of the financial sector. Project appraisal and follow-up capabilities of many banks, particularly public sector banks, also need focused attention and upgradation so that project viability can be properly evaluated and risk mitigants provided where needed.

(xv) Greater Participation of State Governments

In a federal country like India, participation and support of the State governments is essential for developing high quality infrastructure. The State governments' support in maintenance of law and order, land acquisition, rehabilitation and settlement of displaced persons, shifting of utilities, and obtaining environmental clearances are necessary for the projects undertaken by the Central Government or the private sector. It is satisfying to know that many State governments have also initiated several PPP projects for improving infrastructure.

(xvi) Improving efficiency of the Corporate Bond Market

As has been noted, vibrant corporate bond market will reduce the dependence on the banking sector for funds. Further, coordinated regulatory initiatives could be considered in the areas involving standardization of stamp duties on corporate bonds across the states, encouraging public issuance and bringing in institutional investors in a big way. It is also important to broad base the investor base by bringing in new classes of institutional investors (like insurance companies, pension funds, provident funds, etc.) apart from banks into this market. We also need to reorient the investment guidelines of institutional investors like insurance companies, provident funds, etc. since the existing mandates of most of these institutions do not permit large investment in corporate bonds. As of now, the insurance and pension funds are legally required to invest a substantial proportion of their funds in Government Securities. These investment requirements limit their ability to invest in infrastructure bonds. Further, they can only invest in a blue chip stock, which is also acting as a limiting factor since most of the SPVs created for infrastructure funding are unlisted entities. Interest rate derivatives to hedge interest rate risks are being broadened. Reserve Bank has therefore permitted introduction of Interest Rate Futures (IRFs) on

91 day Treasury bills and 10 year G-sec papers. Reserve Bank is also considering further broadening the IRF products by including cash settled IRFs in the two and five year segments[†].

(xvii) Credit Enhancement

One of the major obstacles in attracting foreign debt capital for infrastructure is the sovereign credit rating ceiling. Domestic investors are also inhibited due to high level of credit risk perception, particularly in the absence of sound bankruptcy framework. A credit enhancement mechanism can possibly bridge the rating gap between the investment norms, risk perceptions and actual ratings. Ideally, the credit enhancement should not be provided by the banks as they are already over-exposed to the sector. Further, such bank based backup facility will not lead to genuine development of corporate bond market. Instead we need to think creatively of other mechanisms involving national or supranational support. Working towards this direction, recently Asian Development Bank has offered to partially guarantee infrastructure bonds issued by the Indian companies. One can expect with hope positive outcome from such an arrangement.

(xviii) Simplification of Procedures – Enabling Single Window Clearance

It is well recognized that while funding is the major problem for infrastructure financing, there are other issues which aggravate the problems of raising funds. These include legal disputes regarding land acquisition, delay in getting other clearances (leading to time and cost overruns) and linkages (e.g. coal, power, water, etc.) among others. It is felt that in respect of mega-projects, beyond certain cut-off point, single window clearance approach could cut down the implementation period. Once we solve these peripheral but critical issues with regard to an infrastructure project, it will greatly facilitate flow of funds to the projects and help in maintaining asset quality to the comfort of the lenders.

We also need to develop new financial markets for municipal bonds to enable infrastructure financing at the grass root levels. We need to create depth, liquidity and vibrancy in the G-Sec and corporate bond market so as to enable raising of finance and reduce dependence on the banking system. At the same time, there is a need to widen our investor base and offer adequate risk mitigating financial products, such as, CDS. Market players should also actively participate in such markets after the products have been introduced. A Working Group has been set up by the Reserve Bank recently to examine the issues and recommend measures to further improve the depth and breadth of the G-Sec market. A vibrant G-Sec market would facilitate growth of the corporate debt market. We also need to revisit the existing provisions of stamp duty governed by separate State Government Acts in respect of corporate bond transactions.

4.17 PRICE INDICES

Inflation Measured in India

Inflation is usually measured based on certain indices. Broadly, there are two categories of indices for measuring inflation i.e. Wholesale Prices and Consumer Prices. There are certain sub-categories for these indices.

Index Number

An Index number is a single figure that shows how the whole set of related variables has changed over time or from one place to another. In particular, a price index reflects the overall change in a set of prices paid by a consumer or a producer, and is conventionally known as a Cost-of-Living index or Producer's Price Index as the case may be.

Price Indexes / Indices used in India:

In India we use five major national indices for measuring inflation or price levels.

(A) The Wholesale Price Index (base 1993-94) is usually considered as the headline inflation indicator in India.



- (B) In addition to Whole Price Index (WPI), there are four different consumer price indices which are used to assess the inflation for different sections of the labour force. These are discussed in more details later on.
- (C) In addition to above five indices, the GDP deflator as an indicator of inflation is available for the economy as a whole and its different sectors, on a quarterly basis

Now let us discuss the above indices used in India to measure inflation in detail to understand these better.

Wholesale Price Index (WPI)

This index is the most widely used inflation indicator in India. This is published by the Office of Economic Adviser, Ministry of Commerce and Industry. WPI captures price movements in a most comprehensive way. It is widely used by Government, banks, industry and business circles. Important monetary and fiscal policy changes are linked to WPI movements. It is in use since 1939 and is being published since 1947 regularly. We are well aware that with the changing times, the economies too undergo structural changes. Thus, there is a need for revisiting such indices from time to time and new set of articles / commodities are required to be included based on current economic scenarios. Thus, since 1939, the base year of WPI has been revised on number of occasions. The current series of Wholesale Price Index has 2004-05 as the base year. Latest revision of WPI has been done by shifting base year from 1993-94 to 2004-05 on the recommendations of the Working Group set up with Prof Abhijit Sen., Member, Planning Commission as Chairman for revision of WPI series. This new series with base year 2004-05 has been launched on 14th September, 2010. A brief on the historical development of this WPI is given below: -

Base Year	Year of Introduction	No of Items in Index	No of Price Quotations
Week ended 19th August 1939	1942	23	23
End August 1939	1947	78	215
1952-53 (1948-49 as weight base)	1952	112	555
1961-62	July 1969	139	774
1970-71	January 1977	350	1295
1981-82	July 1989	447	2371
1993-94	April 2000	435	1918
2004-05	September 2010	676	5482

Earlier, the concept of wholesale price covered the general idea of capturing all transactions carried out in the domestic market. The weights of the WPI did not correspond to contribution of the goods concerned either to value - added or final use. In order to give this idea a more precise definition, it was decided to define the universe of the wholesale price index as comprising as far as possible all transactions at first point of bulk sale in the domestic market.

4.18 INTERNAL SOURCES OF FINANCE

There are five internal sources of finance:

- (i) Owner's investment (start up or additional capital)
- (ii) Retained profits
- (iii) Sale of stock
- (iv) Sale of fixed assets
- (v) Debt collection

(i) Owner's investment

- This is money which comes from the owner/s own savings
- It may be in the form of start up capital - used when the business is setting up
- It may be in the form of additional capital – perhaps used for expansion
- This is a long-term source of finance

Advantages

- Doesn't have to be repaid
- No interest is payable

Disadvantages

- There is a limit to the amount an owner can invest

(ii) Retained Profits

- This source of finance is only available for a business which has been trading for more than one year
- It is when the profits made are ploughed back into the business
- This is a medium or long-term source of finance

Advantages

- Doesn't have to be repaid
- No interest is payable

Disadvantages

- Not available to a new business
- Business may not make enough profit to plough back
- Internal Sources

(iii) Sale of Stock

- This money comes in from selling off unsold stock
- This is what happens in the January sales
- It is when the profits made are ploughed back into the business
- This is a short-term source of finance

Advantages

- Quick way of raising finance
- By selling off stock it reduces the costs associated with holding them

Disadvantages

- Business will have to take a reduced price for the stock

(iv) Sale of Fixed Assets

- This money comes in from selling off fixed assets, such as:
a piece of machinery that is no longer needed
- Businesses do not always have surplus fixed assets which they can sell off
- There is also a limit to the number of fixed assets a firm can sell off



- This is a medium-term source of finance

Advantages

- Good way to raise finance from an asset that is no longer needed

Disadvantages

- Some businesses are unlikely to have surplus assets to sell
- Can be a slow method of raising finance

(v) Debt Collection

- A debtor is someone who owes a business money
- A business can raise finance by collecting the money owed to them (debts) from their debtors
- Not all businesses have debtors ie those who deal only in cash
- This is a short-term source of finance

Advantages

- No additional cost in getting this finance, it is part of the businesses' normal operations

Disadvantages

- There is a risk that debts owed can go bad and not be repaid

4.19 SHORT TERM SOURCES

(a) Trade credit

Trade credit refers to credit that a buyer firm gets from the suppliers of goods in the normal course of its operations. It is a dominant part of accounts payable. It appears as 'sundry creditors' on the Indian firms' balance sheets. Trade credit is a cheaper source of short term finance than the institutional agencies. It is because suppliers, having better information and control over buyer than the institutional agencies offer better terms in extending the trade credit.

The advantages of trade credit are as follows:

- **Easy availability:** In most of the cases (except financially distressed firms), trade credit is automatic and does not require any negotiations.
- **Flexibility:** As mentioned earlier, the amount of trade credit is positively associated with the level of firm's operations. It increases (decreases) with the increase (decline) in firm's sales.
- **Informality:** Trade credit is a spontaneous source of finance, does not require any formal agreement.

Trade credit seems to be cost free as it does not involve any explicit interest charges. But it involves implicit cost. Extending trade credit is nothing but financing buyer purchases; it involves costs to the supplier. Such costs of trade credit may be transferred to the buyer firm by increased price of goods / services. However, the extent of such a transfer depends on the bargaining power of supplier and buyer in the market.

(b) Raising of Capital through equity

A company may raise funds for different purposes depending on the time periods ranging from very short to fairly long duration. The total amount of financial needs of a company depends on the nature and size of the business. The scope of raising funds depends on the sources from which funds may be available. The business forms of sole proprietor and partnership have limited opportunities for raising funds. They can finance their business by the following means :-

- Investment of own savings
- Raising loans from friends and relatives
- Arranging advances from commercial banks
- Borrowing from finance companies

Companies can Raise Finance by a Number of Methods. To Raise Long-Term and Medium-Term Capital, they have the following options:-

(i) Issue of Shares

It is the most important method. The liability of shareholders is limited to the face value of shares, and they are also easily transferable. A private company cannot invite the general public to subscribe for its share capital and its shares are also not freely transferable. But for public limited companies there are no such restrictions. There are two types of shares :-

Equity shares :- the rate of dividend on these shares depends on the profits available and the discretion of directors. Hence, there is no fixed burden on the company. Each share carries one vote.

Preference shares :- dividend is payable on these shares at a fixed rate and is payable only if there are profits. Hence, there is no compulsory burden on the company's finances. Such shares do not give voting rights.

(ii) Issue of Debentures:- Companies generally have powers to borrow and raise loans by issuing debentures. The rate of interest payable on debentures is fixed at the time of issue and are recovered by a charge on the property or assets of the company, which provide the necessary security for payment. The company is liable to pay interest even if there are no profits. Debentures are mostly issued to finance the long-term requirements of business and do not carry any voting rights.

(c) Loans from Financial Institutions:- Long-term and medium-term loans can be secured by companies from financial institutions like the Industrial Finance Corporation of India, Industrial Credit and Investment Corporation of India (ICICI), State level Industrial Development Corporations, etc. These financial institutions grant loans for a maximum period of 25 years against approved schemes or projects. Loans agreed to be sanctioned must be covered by securities by way of mortgage of the company's property or assignment of stocks, shares, gold, etc.

(d) Loans from Commercial Banks:- Medium-term loans can be raised by companies from commercial banks against the security of properties and assets. Funds required for modernisation and renovation of assets can be borrowed from banks. This method of financing does not require any legal formality except that of creating a mortgage on the assets.

(e) Public Deposits:- Companies often raise funds by inviting their shareholders, employees and the general public to deposit their savings with the company. The Companies Act permits such deposits to be received for a period up to 3 years at a time. Public deposits can be raised by companies to meet their medium-term as well as short-term financial needs. The increasing popularity of public deposits is due to :-

- The rate of interest the companies have to pay on them is lower than the interest on bank loans.
- These are easier methods of mobilising funds than banks, especially during periods of credit squeeze.
- They are unsecured.
- Unlike commercial banks, the company does not need to satisfy credit-worthiness for securing loans.

(f) Reinvestment of Profits:- Profitable companies do not generally distribute the whole amount of profits as dividend but, transfer certain proportion to reserves. This may be regarded as reinvestment of profits or ploughing back of profits. As these retained profits actually belong to the shareholders



of the company, these are treated as a part of ownership capital. Retention of profits is a sort of self financing of business. The reserves built up over the years by ploughing back of profits may be utilised by the company for the following purposes :-

- Expansion of the undertaking
- Replacement of obsolete assets and modernisation.
- of old Meeting permanent or special working capital requirement.
- Redemption debts.

The benefits of this source of finance to the company are :-

- It reduces the dependence on external sources of finance.
- It increases the credit worthiness of the company.
- It enables the company to withstand difficult situations.
- It enables the company to adopt a stable dividend policy.

(g) Factoring

The amounts due to a company from customers, on account of credit sale generally remains outstanding during the period of credit allowed i.e. till the dues are collected from the debtors. The book debts may be assigned to a bank and cash realised in advance from the bank. Thus, the responsibility of collecting the debtors' balance is taken over by the bank on payment of specified charges by the company. This method of raising short-term capital is known as factoring. The bank charges payable for the purpose is treated as the cost of raising funds.

Discounting Bills of Exchange

This method is widely used by companies for raising short-term finance. When the goods are sold on credit, bills of exchange are generally drawn for acceptance by the buyers of goods. Instead of holding the bills till the date of maturity, companies can discount them with commercial banks on payment of a charge known as bank discount. The rate of discount to be charged by banks is prescribed by the Reserve Bank of India from time to time. The amount of discount is deducted from the value of bills at the time of discounting. The cost of raising finance by this method is the discount charged by the bank.

(h) Bank Overdraft and Cash Credit

It is a common method adopted by companies for meeting short-term financial requirements. Cash credit refers to an arrangement whereby the commercial bank allows money to be drawn as advances from time to time within a specified limit. This facility is granted against the security of goods in stock, or promissory notes bearing a second signature, or other marketable instruments like Government bonds. Overdraft is a temporary arrangement with the bank which permits the company to overdraw from its current deposit account with the bank up to a certain limit. The overdraft facility is also granted against securities. The rate of interest charged on cash credit and overdraft is relatively much higher than the rate of interest on bank deposits

4.20 ISSUES AND CHALLENGES CONSTRAINING INFRASTRUCTURE FUNDING

While there are multiple roadblocks like delays in approvals, land acquisition, and environment clearances etc. impeding the acceleration of the infrastructure development, one of the key one which will be critical for future is the availability of funds.

An important distinction to draw when considering the financial elements of an infrastructure project is that between funding and financing. The funding for a project could be defined as its long-term source of support. In the case of public infrastructure, this may be revenues generated by the project, dedicated

tax revenues or general resources of the sponsoring public sector entity. The financing of a project is the means by which the funding is leveraged to provide enough up-front cash to purchase, construct or adapt the project. While there may be many creative financing vehicles available, once the funding structure is established, all of these financing vehicles will be "securitizing" the same project economics.

Based on industry analysis, we have identified key issues and challenges that are thought to be constraining the flow of funds towards infrastructure development. These issues and challenges are as listed below :

(i) Regulatory & Macro-economic Constraints

Highly regulated investment norms constrain the flow of funding to infrastructure projects.

- NBFCs infrastructure investment growth is limited by their access to bank finance. Tighter prudential limits on bank lending to NBFCs have capped their access to commercial bank funds
- IRDA has set stringent guidelines towards investment in infrastructure bonds. As per the guidelines, the rating quality of investment bonds should not be less than AA whereas a typical non-recourse infrastructure project is rated BB. Moreover, 75 per cent of all debt investments in an insurance company's portfolio (excluding government and other approved securities) must have AAA rating
- Statutory restrictions imposed by Government of India on infrastructure: Some key restrictions include minimum credit rating for debt instruments and minimum dividend payment record of seven years for equity. These are difficult conditions for private infrastructure projects to meet as they have been set up recently and do not enjoy high credit rating in the initial years
- Equity markets are not favorable for financing projects because of uncertainties in the global economy and due to present regulatory requirements limiting exit options, which hinder equity infusion. Moreover, most infrastructure companies have already diluted their equity in public to raise capital and further dilution is not possible due to contractual restrictions imposed on them
- Sale of unlisted projects is subject to capital gains tax which acts as a disincentive to most equity investors. There is also a growing perception amongst the equity shareholders that the termination payments in the event of government agency defaults are not adequate in most concession agreements
- The PFRDA guidelines allow investment in credit risk bearing fixed income instruments (Asset class C). However, at least 75% of the investment in this category is to be made in instruments having an investment grade rating from at least one credit rating agency. The sectoral cap of 75% of the investment having an investment grade rating under Asset class C scheme, has led to Pension Funds missing on the opportunity to invest in infrastructure projects
- Sovereign credit rating of BBB- limits investments from foreign funds

(ii) Under-developed financial markets

- Absence of a well-developed financial system facilitating long term financing has put additional burden on the banks to fill the void. It is risky and limits the lending ability of banks when they engage short term funds for long investment in Infrastructure projects that have a long gestation period (above 5 years). To offset this bank lends on floating rates which is derived on the base rate. Eventually, the project cost may escalate as it becomes susceptible to interest rate fluctuations
- Lack of derivative market and interest rate derivative market that implies that investors are unable to manage risks efficiently
- ECB imposes all in cost ceiling that allows access only to highly rated companies. Financial intermediaries, such as banks, FIs, HFCs and NBFCs are not eligible to raise sums through ECB
- Almost one third of India's saving rate of 37% is directed towards physical assets. Also, financial savings are not properly channelized towards infrastructure projects due to lack of long term savings options in the form of pension and insurance



- Foreign exchange hedging: Foreign exchange hedging is not available for long tenures especially for a period of more than 8 years and even if they are available, they attract high premiums. Foreign investors are not comfortable betting on India for long tenures.

(iii) Institutional Constraints

- Most of the life insurance players except LIC have limited non ULIP liabilities that they can deploy in infrastructure. Thus, they face asset liability mismatch in investing long term
- Public insurance companies are inherently very risk averse. They invest mostly in government securities and in publicly-listed infrastructure companies towards meeting their mandated minimum infrastructure and social sector requirements rather than funding infrastructure projects
- Most EPC contractors in the country are already working on stretched working capital and debt exposure limits. Moreover, constraints such as labor and manpower shortage, lack of skilled resources, shortage of equipment add to time and cost overruns
- Low ratings of infrastructure SPV's: The level of ratings achieved by SPV's restricts the flow of foreign funds in the form of debt. High levels of risk attached leads to equity investments in place of debt financing. SPV's normally do not have a proven credit history and strong balance sheets. This further affects their ability to secure financing from outside

4.21 PRIMARY & SECONDARY MARKET STRUCTURE

Two major types of issuers of securities in primary market:

- Corporate entities, who issue mainly debt and equity instruments
- The government (central as well as state), which issues debt securities (dated securities and treasury bills).

Secondary market operates through two mediums:

- Over-the-counter (OTC) market: Informal, negotiated trades. Most of G sec trades, all spot trades for immediate delivery and payment.
- Exchange-traded market: T+2 settlement; counterparty/guarantees settlement through clearing corporation; forward market; Futures & Options

Primary Market

The primary market enables the government as well corporates in raising the capital that is required to meet their requirements of capital expenditure and/or discharge of other obligations such as exit opportunities for venture capitalist/PE firms. The most common primary mechanism for raising capital is an Initial Public Offer (IPO), under which shares are offered to the public as a precursor to trading in the secondary market of an exchange. The price at which the shares are to be issued is decided with the help of the book building mechanism; in the case of oversubscription, the shares are allotted on a pro rata basis. When securities are offered exclusively to the existing shareholders of company, as opposed to the general public, it is known as Rights Issue. Another mechanism whereby a listed company can issue equity shares, as well as fully and partly convertible debentures that can be later converted into equity shares, to a Qualified Institutional Buyer (QIB) is termed as Qualified Institutional Placement. In addition to raising capital in the domestic market,

Secondary Market

Secondary Market refers to a market where securities are traded after being initially offered to the public in the primary market and/or listed on the Stock Exchange. Majority of the trading is done in the secondary market. Secondary market comprises of equity markets and the debt markets.

For the general investor, the secondary market provides an efficient platform for trading of his securities.

For the management of the company, Secondary equity markets serve as a monitoring and control conduit—by facilitating value-enhancing control activities, enabling implementation of incentive-based management contracts, and aggregating information (via price discovery) that guides management decisions.

Difference between the primary market and the secondary market

In the primary market, securities are offered to public for subscription for the purpose of raising capital or fund. Secondary market is an equity trading avenue in which already existing/pre- issued securities are traded amongst investors. Secondary market could be either auction or dealer market. While stock exchange is the part of an auction market, Over-the-Counter (OTC) is a part of the dealer market.

Products dealt in the secondary markets

Following are the main financial products/instruments dealt in the secondary market:

Equity: The ownership interest in a company of holders of its common and preferred stock. The various kinds of equity shares are as follows:-

Equity Shares:

An equity share, commonly referred to as ordinary share also represents the form of fractional ownership in which a shareholder, as a fractional owner, undertakes the maximum entrepreneurial risk associated with a business venture. The holders of such shares are members of the company and have voting rights.

- **Rights Issue / Rights Shares:** The issue of new securities to existing shareholders at a ratio to those already held.
- **Bonus Shares:** Shares issued by the companies to their shareholders free of cost by capitalization of accumulated reserves from the profits earned in the earlier years.
- **Preferred Stock / Preference shares:** Owners of these **kinds** of shares are entitled to a fixed dividend or dividend calculated at a fixed rate to be paid regularly before dividend can be paid in respect of equity share. They also enjoy priority over the equity shareholders in payment of surplus. But in the event of liquidation, their claims rank below the claims of the company's creditors, bondholders / debenture holders.
- **Cumulative Preference Shares:** A type of preference shares on which dividend accumulates if remains unpaid. All arrears of preference dividend have to be paid out before paying dividend on equity shares.
- **Cumulative Convertible Preference Shares:** A type of preference shares where the dividend payable on the same accumulates, if not paid. After a specified date, these shares will be converted into equity capital of the company.
- **Participating Preference Share:** The right of certain preference shareholders to participate in profits after a specified fixed dividend contracted for is paid. Participation right is linked with the quantum of dividend paid on the equity shares over and above a particular specified level.
- **Security Receipts:** Security receipt means a receipt or other security, issued by a securitisation company or reconstruction company to any qualified institutional buyer pursuant to a scheme, evidencing the purchase or acquisition by the holder thereof, of an undivided right, title or interest in the financial asset involved in securitisation.
- **Government securities (G-Secs):** These are sovereign (credit risk-free) coupon bearing instruments which are issued by the Reserve Bank of India on behalf of Government of India, in lieu of the Central Government's market borrowing programme. These securities have a fixed coupon that is paid on specific dates on half-yearly basis. These securities are available in wide range of maturity dates, from short dated (less than one year) to long dated (up to twenty years).



- **Debentures:** Bonds issued by a company bearing a fixed rate of interest usually payable half yearly on specific dates and principal amount repayable on particular date on redemption of the debentures. Debentures are normally secured / charged against the asset of the company in favour of debenture holder.
- **Bond:** A negotiable certificate evidencing indebtedness. It is normally unsecured. A debt security is generally issued by a company, municipality or government agency. A bond investor lends money to the issuer and in exchange, the issuer promises to repay the loan amount on a specified maturity date. The issuer usually pays the bond holder periodic interest payments over the life of the loan. The various types of Bonds are as follows-
 - Zero Coupon Bond: Bond issued at a discount and repaid at a face value. No periodic interest is paid. The difference between the issue price and redemption price represents the return to the holder. The buyer of these bonds receives only one payment, at the maturity of the bond.
 - Convertible Bond: A bond giving the investor the option to convert the bond into equity at a fixed conversion price.
- **Commercial Paper:** A short term promise to repay a fixed amount that is placed on the market either directly or through a specialized intermediary. It is usually issued by companies with a high credit standing in the form of a promissory note redeemable at par to the holder on maturity and therefore, doesn't require any guarantee. Commercial paper is a money market instrument issued normally for tenure of 90 days.
- **Treasury Bills:** Short-term (up to 91 days) bearer discount security issued by the Government as a means of financing its cash requirements.



Section B

Financial Risk Management



Study Note - 5

CAPITAL MARKET INSTRUMENTS



This Study Note includes

- 5.1 Capital Market**
- 5.2 Primary and Secondary Markets and its Instruments**
- 5.3 Optionally Convertible Debentures and Deep Discount Bonds**
- 5.4 Rolling Settlement, Clearing House Operations**
- 5.5 Dematerialisation & Rematerialisation**
- 5.6 Depository System**
- 5.7 Initial Public Offer (IPO)/ Follow on Public Offer (FPO); Book Building**
- 5.8 Auction & Insider Trading**
- 5.9 Credit Rating- Objectives, Sources, Process, Credit Rating Agencies in India**

5.1 CAPITAL MARKET

Capital market is a market for long-term debt and equity shares. In this market, the capital funds comprising of both equity and debt are issued and traded. This also includes private placement sources of debt and equity as well as organized markets like stock exchanges. Capital market includes financial instruments with more than one year maturity. It is defined as a market in which money is provided for periods longer than a year, as the raising of short-term funds takes place on other markets (e.g., the money market). The capital market is characterized by a large variety of financial instruments: equity and preference shares, fully convertible debentures (FCDs), non-convertible debentures (NCDs) and partly convertible debentures (PCDs) currently dominate the capital market, however new instruments are being introduced such as debentures bundled with warrants, participating preference shares, zero-coupon bonds, secured premium notes, etc.

Functions of a Capital Market:

The capital market is an important constituent of the financial system. The functions of an efficient capital market are as follows:

- ❖ Mobilise long-term savings to finance long-term investments.
- ❖ Provide risk capital in the form of equity or quasi-equity to entrepreneurs.
- ❖ Encourage broader ownership of productive assets.
- ❖ Provide liquidity with a mechanism enabling the investor to sell financial assets.
- ❖ Lower the costs of transactions and information.
- ❖ Improve the efficiency of capital allocation through a competitive pricing mechanism.
- ❖ Enable quick valuation of financial instruments-both equity and debt.
- ❖ Provide insurance against market risk or price risk through derivative trading and default risk through investment protection fund.

- ❖ Provide operational efficiency through:
 - ✓ Simplified transaction procedures;
 - ✓ Lowering settlement timings; and
 - ✓ Lowering transaction costs.
- ❖ Develop integration among:
 - ✓ Real and financial sectors;
 - ✓ Equity and debt instruments;
 - ✓ Long-term and short-term funds;
 - ✓ Long-term and short-term interest costs;
 - ✓ Private and government sectors; and
 - ✓ Domestic and external funds.
- ❖ Direct the flow of funds into efficient channels through investment, disinvestment, and reinvestment.
- ❖ Enable wider participation by enhancing the width of the market by encouraging participation through networking institutions and associating individuals.

Classification of Capital Market:

Primary Market
Secondary Market

5.2 PRIMARY AND SECONDARY MARKETS AND ITS INSTRUMENTS

Primary Market:

The primary market is a market for new issues. This refers to the long-term flow of funds from the surplus sector to the government and corporate sector through primary issues and to banks and non-bank financial intermediaries through secondary issues. Funds are mobilised in the primary market through prospectus, rights issues, and private placement.

Types of Issues in Primary Market:

Public Issue			Private Placement
Initial Public offering (IPO)	Rights Issue	Bonus Issue	Private Placement (Unlisted Companies)
Follow-on Public Offering (FPO)			Preferential Issue
			Qualified Institutions Placement (for Listed Companies)

Participants in the Primary Market:

- ❖ Merchant Bankers
- ❖ Bankers to an Issue
- ❖ Registrar to an Issue
- ❖ Underwriters to the Issue



- ❖ Investment Banks
- ❖ Depositories
- ❖ Portfolio Managers
- ❖ Custodians

Secondary Market:

The secondary market is a market in which existing securities are resold or traded. This market is also known as the stock market. In India, the secondary market consists of recognized stock exchanges operating under rules, by-laws and regulations duly approved by the government.

Functions of the Secondary Market:

- ❖ To contribute to economic growth through allocation of funds to the most efficient channel through the process of disinvestment to reinvestment.
- ❖ To facilitate liquidity and marketability of the outstanding equity and debt instruments.
- ❖ To ensure a measure of safety and fair dealing to protect investors' interests.
- ❖ To induce companies to improve performance since the market price at the stock exchanges reflects the performance and this market price is readily available to investors.
- ❖ To provide instant valuation of securities caused by changes in the internal environment.

The Indian secondary market can be segregated into two:

1. The secondary market for corporate and financial intermediaries. The participants in this market are registered brokers - both individuals and institutions. They operate through a network of sub-brokers and sub-dealers and are connected through an electronic networking system.
2. The secondary market for government securities and public sector undertaking bonds. The trading in government securities is basically divided into the short-term money market instruments such as treasury bills and long-term government bonds ranging in maturity from 5 to 20 years.

The main participants in the secondary market for government securities are entities like primary dealers, banks, financial institutions, and mutual funds.

Difference between Primary and Secondary Market:

Basis	Primary Markets	Secondary Markets
Nature of Securities	It deals with new securities, i.e. securities which were not previously available, and are offered for the first time to the investors.	It is a market for old securities which have been issued already
Sale/Purchase	Securities are acquired from issuing companies themselves.	Securities are purchased and sold by the investors without any involvement of the companies.
Nature of Financing	It provides funds to new enterprises & also for expansion and diversification of the existing one.	It does not supply additional funds to company since the company is not involved in transaction.
Liquidity	It does not lend any liquidity to the securities.	The secondary market provides facilities for the continuous purchase and sale of securities, thus lending liquidity and marketability to the securities.

Organisational Difference	It is not rooted in any particular spot and has no geographical existence. It has neither any tangible form nor any administrative organisational set up.	Secondary market has physical existence in the form of stock exchange and are located in a particular geographical area having an administrative organisation.

Similarities between Primary and Secondary Market:

- 1. Listing:** One aspect of inseparable connection between them is that the securities issued in the primary market are invariably listed on a secondary market (recognized stock exchange) for dealings in them. The practice of listing of new issues on the stock market is of immense utility to the potential investors who can be sure that when they receive an allotment of new issues, they will subsequently be able to dispose them off any time in the Stock Exchange.
- 2. Control:** The stock exchanges exercise considerable control over the organization of new issues. The new issues of securities which seek stock quotation/listing have to comply with statutory rules as well as regulations framed by the stock exchanges. If the new issues do not conform to the prescribed stipulations, the stock exchanges would refuse listing facilities to them. This requirement obviously enables the stock exchange to exercise considerable control over the new issues market and is indicative of close relationship between the two.
- 3. Mutual Interdependence:** The markets for new and old securities are, economically, an integral part of a single market- the capital market. Their mutual interdependence from the economic point of view has two dimensions.

Basic Capital Market Instruments:

A. Equity Securities	B. Debt Securities
Equity Shares	Debentures
Preference Shares	Bonds

These two types of securities are traded in separate markets in stock exchanges. They are briefly outlined as under:

A. Equity Securities:

- i) Equity Shares:** Equity Share represents the form of fractional ownership in which a Shareholder, as a fractional owner, undertakes the maximum entrepreneurial risk associated with a business venture. A company may issue such shares with differential rights as to voting, payment of dividend, etc.
- ii) Preferred Stock/Preference Shares:** Preference Shareholders are entitled to a fixed dividend or dividend calculated at a fixed rate to be paid regularly before dividend is paid in respect of Equity Share. They also enjoy priority over the Equity Shareholders in payment of surplus. There are various types of Preference Shares viz. Cumulative and Non-Cumulative Preference Shares, Convertible and Non-Convertible Preference Shares, Participating and Non-Participating Preference Shares, Redeemable and Non-Redeemable Preference Shares etc.

B. Debt Securities:

- i) Debentures:** A Debenture is a document issued by a company under its common seal acknowledging a debt to the holders. It is a debt security issued by a company which offers to pay interest for the money it borrows for a certain period. Debenture holders are treated as creditors of the company. As per SEBI guidelines, no public or rights issue of convertible or non-convertible debentures shall be made unless a credit rating from a credit rating agency has been obtained and disclosed in the offer document. Where the public or rights issue of



debt security of issue greater than ₹100 crore or its equivalent are issued, two ratings from two different agencies shall be obtained. In case of issue of debentures with maturity of more than 18 months, the issuer shall also appoint a debenture trustee. The names of the debenture trustees must be stated in the offer document. A company issuing debentures with a maturity of more than 18 months should create a debenture redemption reserve.

Some of the prominent types of debentures are: a) Based on Security, Secured and Unsecured Debentures, b) Based on Registration of the instrument, Registered and Bearer Debentures, c) Based on Convertibility, Fully Convertible Debentures, Zero Interest Fully Convertible Debentures, Partly Convertible Debentures, Non-convertible Debentures, Non-convertible Debentures with Detachable Warrants, Optionally Convertible Debentures, d) Based on Redemption, Redeemable Debentures and Irredeemable Debentures, e) Other Types, Participating Debentures and Debentures with a Floating Rate of Interest.

- ii) **Bonds:** A bond is a negotiable certificate which entitles the holder for repayment of the principal sum plus interest. They are debt securities issued by a company, or Government agency whereby a bond investor lends money to the Issuer, and in exchange, the issuer promises to repay the loan amount on a specified maturity date. Features and the various types of Bonds have been discussed in study note 2.4 (Financial Market Instruments) already.

Other financial instruments that are traded in market:

1. Secured Premium Notes (SPN's):

- a) **Meaning:** Secured Premium Notes are debt instruments issued along with a detachable warrant and is redeemable after a specified period (4 to 7 Years).
- b) **Option to Convert:** SPNs carry an option to convert into equity shares, i.e. the detachable warrant can be converted into Equity Shares.
- c) **Period for Conversion:** Conversion of detachable warrant into equity shares should be done within a time period specified by the company.

2. American Depository receipts (ADRs):

American Depository Receipts popularly known as ADRs were introduced in the American market in 1927. ADRs are negotiable instruments, denominated in dollars, and issued by the US Depository Bank. A non-US company that seeks to list in the US, deposits its shares with a bank and receives a receipt which enables the company to issue ADRs. These ADRs serve as stock certificates and are used interchangeably with ADRs which represent ownership of deposited shares. Among the Indian ADRs listed on the US markets, are Infy (the Infosys Technologies ADR), WIT (the Wipro ADR), Rdy(the Dr Reddy's Lab ADR), and Say (the Satyam Computer ADS).

3. Global Depository Receipts (GDRs):

GDRs are equity instruments issued abroad by authorized overseas corporate bodies against the shares/bonds of Indian companies held with nominated domestic custodian banks. An Indian company intending to issue GDRs will issue the corresponding number of shares to an overseas depository bank. GDRs are freely transferable outside India and dividend in respect of the share represented by the GDR is paid in Indian rupees only. They are listed and traded on a foreign stock exchange. GDRs are fungible, which means the holder of GDRs can instruct the depository to convert them into underlying shares and sell them in the domestic market. Most of the Indian companies have their GDR issues listed on the Luxembourg Stock Exchange and the London Stock Exchange. Indian GDRs are primarily sold to institutional investors and the major demand is in the UK, US, Hongkong, Singapore, France and Switzerland.

4. Derivatives:

A derivative is a financial instrument, whose value depends on the values of basic underlying variable. In the sense, derivatives is a financial instrument that offers return based on the return of some other underlying asset, i.e., the return is *derived* from another instrument. Derivatives are a mechanism to hedge market, interest rate, and exchange rate risks. Derivatives market is divided into two types- Financial market and Commodity market. Types of Financial

Derivatives include: Forwards, Futures, Options, Warrants, Swaps, Swaptions. There are three types of traders in the derivatives market: Hedger, Speculator and arbitrageur.

5.3 OPTIONALLY CONVERTIBLE DEBENTURES AND DEEP DISCOUNT BONDS

Optionally Convertible Debentures (OCD):

These are the debentures that include the option to get converted into equity. The investor has the option to either convert these debentures into shares at price decided by the issuer/agreed upon at the time of issue.

Advantages of OCD:

(a) Issuer

- ❖ **Quasi-Equity:** Dependence of Financial Institutions is reduced because of the inherent option for conversion (i.e. since these are converted into equity, they need not be repaid in the near future.)
- ❖ **High Equity Line:** It is possible to maintain Equity Price at a high level, by issuing odd-lot shares consequent to conversion of the debentures, and hence lower floating stocks.
- ❖ **Dispensing Ownership:** Optionally Convertible Debentures enable to achieve wide dispersal of equity ownership in small lots pursuant to conversion.
- ❖ **Marketability:** The marketability of the issue will become significantly easier, and issue expenses can be expected to come down with the amounts raised becoming more.

(b) Investor

- ❖ **Assured Interest:** Investor gets assured interest during gestation periods of the project, and starts receiving dividends once the project is functional and they choose to convert their debentures. Thereby, it brings down the effective gestation period at the investor's end to zero.
- ❖ **Secured Investment:** The investment is secured against the assets of the Company, as against Company deposits which are unsecured.
- ❖ **Capital Gains:** There is a possibility of Capital Gains associated with conversion, which compensates for the lower interest rate on debentures.

(c) Government

- ❖ Debentures helped in mobilizing significant resources from the public and help in spreading the Equity Investors, thereby reducing the pressure on Financial Institutions (which are managed by Government) for their resources.
- ❖ By making suitable tax amendments, benefits are extended to promote these instruments, to :-
 - (i) safeguard the funds of Financial Institutions,
 - (ii) encouraging more equity participation, which will also require a higher compliance under Corporate Laws, whereby organisations can be monitored more effectively.

Disadvantages of OCD:

(a) Issuer

- ❖ Ability to match the projected cash inflows and outflows by altering the terms and timing of conversion is diluted, and becomes a function of performance of the Company and hence its market price.



- ❖ The Company is not assured of hefty share premiums based on its past performance and an assured conversion of debentures.
- ❖ Planning of capital structure becomes difficult in view of the uncertainties associated with conversion.

(b) Investor: There are many regulatory requirements to be complied with for conversion.

Deep Discount Bonds (DDB's)

Deep Discount Bond is a form of zero-interest bonds, which are sold at a discounted value (i.e. below par) and on maturity, the face value is paid to investors. A bond that sells at a significant discount from par value and has no coupon rate or lower coupon rate than the prevailing rates of fixed-income securities with a similar risk profile. They are designed to meet the long term funds requirements of the issuer and investors who are not looking for immediate return and can be sold with a long maturity of 25-30 years at a deep discount on the face value of debentures

Example: Bond of a face value of ₹1Lakh may be issued for ₹5,000 for a maturity value of ₹1,00,000 after 20 Years.

Periodic Redemption: Issuing Company may also give options for redemption at periodical intervals such as 5 Years or 10 Years etc.

No Interest: There is no interest payment during the lock-in / holding period.

Market Trade: These bonds can be traded in the market. Hence, the investor can also sell the bonds in stock market and realize the difference between initial investment and market price.

5.4 ROLLING SETTLEMENT, CLEARING HOUSE OPERATIONS

5.4.1 Rolling Settlement:

Settlement refers to the process in which traders who have made purchases make payments while those who have sold shares, deliver them. The exchange ensures that buyers receive their shares and the sellers receive payment for the same. The process of settlement is managed by stock exchanges through Clearing Houses.

A Rolling Settlement is the settlement cycle of the Stock Exchange, where all trades outstanding at the end of the day have to be settled, i.e. the buyer has to make payments for securities purchased and seller has to deliver the securities sold.

Example: In case of T + 1 Settlement, transactions entered on a day should be settled within the next working day. In case of T + 2 Settlement, settlement should be made within two working days from the date of transaction.

Benefits of Rolling Settlement:

- In rolling settlements, payments are quicker than in weekly settlements. Thus, investors benefit from increased liquidity,
- It keeps cash and forward markets separate,
- Rolling settlements provide for a higher degree of safety,
- From an investor's perspective, rolling settlement reduces delays. This also reduces the tendency for price trends to get exaggerated. Hence, investors not only get a better price but can also act at their leisure.

International Scenario: Internationally, most developed countries follow the rolling settlement system. For instance, both the US and the UK follow a rolling settlement (T+3) system, while the German stock exchanges follow a (T+2) settlement cycle.

5.4.2 Clearing House Operations (CHO):

Clearing House is a body either owned by or independently associated with an Exchange and charged with the function of ensuring the financial integrity of each trade. Orders entered into by Members are cleared by means of the Clearing House. Clearing Houses provide a range of services related to the Guarantee of Contracts, Clearance and Settlement of Trades, and Management of risk for their Members and Associated Exchanges.

Role of CHO:

- a) It ensures adherence to the system and procedures for smooth trading.
- b) It minimizes credit risks by being a counter party to all trades.
- c) It involves daily accounting of all gains or losses.
- d) It ensures delivery of payment for assets on the maturity dates for all outstanding contracts.
- e) It monitors the maintenance of speculation margins.

Working of CHO:

- a) The clearinghouse acts as the medium of transaction between the buyer and the seller. Every contract between a buyer and a seller is substituted by two contracts so that clearing house becomes the buyer to every seller and the seller to every buyer.

Example: In a transaction where P sells futures to R, R is replaced by the clearing house and the risk taken by P becomes insignificant. Similarly, the credit risk of R is taken over by the clearing house; thus, the credit risk is now assumed by the clearing house rather than by individuals.

- b) The credit risk of the clearing house is minimized by collecting Margins depending upon the volatility of the instrument and adjusted everyday for price movements.

5.5 DEMATERIALISATION & REMATERIALISATION

Dematerialisation:

Dematerialisation is the process of converting physical certificates to an equivalent number of securities in electronic form and credited into the investor's account with his / her Depository Participant. In simple terms, it refers to paperless trading. Dematerialised shares do not have any distinctive numbers. These shares are fungible, which means that all the holdings of a particular security will be identical and interchangeable.

Process of Dematerialisation:

In order to dematerialise physical securities one has to fill in a DRF (Demat Request Form) which is available with the DP and submit the same along with physical certificates that are to be dematerialised. Separate DRF has to be filled for each ISIN. The complete process of dematerialisation is outlined below:

- ❖ Surrender certificates for dematerialisation to your DP.
- ❖ DP intimates to the Depository regarding the request through the system.
- ❖ DP submits the certificates to the registrar of the Issuer Company.
- ❖ Registrar confirms the dematerialisation request from depository.
- ❖ After dematerialising the certificates, Registrar updates accounts and informs depository regarding completion of dematerialisation.
- ❖ Depository updates its accounts and informs the DP.
- ❖ DP updates the demat account of the investor.

**Scheme:**

- a) The Shareholder does not have a certificate to claim ownership of shares in a company. His interest is reflected by way of entries in the books of depository (an intermediary agent who maintains the share accounts of the shareholders)
- b) This is similar to bank account, where the account holder, and not the banker, is the true owner of the money value of sum indicated against his name in the bank's books.

Depository Participant:

- a) A Depository is an organization, which holds securities of investors in electronic form at the request of the investor through a registered Depository Participant. Example: NSDL, CSDL.
- b) It also provides services related to transactions in securities.
- c) A Depository Participant (DP) is an agent of the depository registered from SEBI through which it interfaces with the Investor.

Advantages: The advantages of holding securities in demat form are —

Investor's View Point	Issuer-Company's View Point
a) It is speedier and avoids delay in transfers.	a) Savings in printing certificates, postage expenses.
b) Avoids lot of paper work.	b) Stamp duty waiver.
c) Saves on stamp duty.	c) Easy monitoring of buying/selling patterns in securities, increasing ability to spot takeover attempts and attempts at price rigging.

Rematerialisation:

Rematerialisation is the process by which a Client/ Shareholder can get his electronic holdings converted into physical certificates.

Features of Rematerialisation:

- a) A client can rematerialise his dematerialised holdings at any point of time.
- b) The rematerialisation process is completed within 30 days.
- c) The securities sent for rematerialisation cannot be traded.

Process of Rematerialisation:

The process is called rematerialisation. If one wishes to get back his securities in the physical form he has to fill in the RRF (Remat Request Form) and request his DP for rematerialisation of the balances in his securities account. The process of rematerialisation is outlined below:

- ❖ Make a request for rematerialisation.
- ❖ Depository participant intimates depository regarding the request through the system.
- ❖ Depository confirms rematerialisation request to the registrar.
- ❖ Registrar updates accounts and prints certificates.
- ❖ Depository updates accounts and downloads details to depository participant.
- ❖ Registrar dispatches certificates to investor.

5.6 DEPOSITORY SYSTEM

A depository is an organisation which holds securities (like shares, debentures, bonds, government securities, mutual fund units etc.) of investors in electronic form at the request of the investors through a registered Depository Participant. It also provides services related to transactions in securities. At present two Depositories viz. National Securities Depository Limited (NSDL) and Central Depository Services (India) Limited (CDSL) are registered with SEBI.

The increase in the volume of activity on stock exchanges with the advent of on-screen trading coupled with operational inefficiencies of the former settlement and clearing system led to the emergence of a new system called the depository system. The SEBI mandated compulsory trading and settlement of select securities in dematerialized form.

5.6.1 Need for Setting-up a Depository in India:

The need was realized in the 1990s due to various reasons as under:

- ❖ A lot of time was consumed in the process of allotment and transfer of shares
- ❖ Increase in volume of transactions
- ❖ Large scale irregularities in the securities scam of 1992 exposed the limitations of the prevailing settlement system
- ❖ Problems associated with dealing in physical shares, such as
 - ✓ problems of theft, fake and/or forged transfers,
 - ✓ share transfer delays particularly due to signature mismatches; and
 - ✓ paper work involved in buying, selling, and transfer leading to costs of handling, storage, transportation, and other back office costs.

To overcome these problems, the Government of India, in 1996, enacted the Depositories Act, 1996 to start depository services in India.

5.6.2 Trading of securities held in Physical and Dematerialised form- Difference

Aspect	Trading of Physical Shares	Trading of Dematerialised Shares
Actual Delivery	Actual Delivery of Share is to be exchanged.	No Actual Delivery of shares is needed.
Open Delivery	Open Delivery can be kept.	Not possible to keep Delivery Open.
Time	Processing Time is long.	Processing Time is less.
Stamp Charges	Stamp Charges @ 0.5% are levied for transfer.	No Stamp Charges are required for transfer.
Sales Transactions	For sales transaction, no charges other than brokerage are levied.	Sales transactions are also charged.
Registration	For buy transaction, document is to be sent to company for Registration.	No need to send the document to the company for Registration.

5.6.3 Depository Process:

There are four parties in a demat transaction: the customer, the depository participant (DP), the depository, and the share registrar and transfer agent (R&T). A Depository Participant (DP) is an agent of the depository through which it interfaces with the investor and provides depository services. Public financial institutions, scheduled commercial banks, foreign banks operating in India with the approval of the Reserve Bank of India, state financial corporations, custodians, stock-brokers, clearing corporations / clearing houses, NBFCs and Registrar to an Issue or Share Transfer Agent complying with



the requirements prescribed by SEBI can be registered as DP. Banking services can be availed through a branch whereas depository services can be availed through a DP. The investor has to enter into an agreement with the DP after which he is issued a client account number or client ID number. PAN Card is now mandatory to operate a demat account.

To become a qualified Depository Participant, a SEBI registered DP shall fulfill the following:

- ❖ DP shall have net worth of ₹50 crore or more;
- ❖ DP shall be either a clearing bank or clearing member of any of the clearing corporations;
- ❖ DP shall have appropriate arrangements for receipt and remittance of money with a designated Authorised Dealer (AD) Category - I bank;
- ❖ DP shall demonstrate that it has systems and procedures to comply with the FATF Standards, Prevention of Money Laundering (PML) Act, Rules and SEBI circulars issued from time to time; and
- ❖ DP shall obtain prior approval of SEBI before commencing the activities relating to opening of accounts of QFI.

Note: The eligibility criteria for qualified Depository Participant as per SEBI circulars vide Cir/IMD/DF/14/2011 and Cir/IMD/FII&C/3/2012 dated August 9, 2011 and January 13, 2012.

As per the available statistics at BSE and NSE, 99.9% transactions take place in dematerialised mode only. Therefore, in view of the convenience of trading in dematerialised mode, it is advisable to have a beneficial owner (BO) account for trading at the exchanges.

However to facilitate trading by small investors (Maximum 500 shares, irrespective of their value) in physical mode the stock exchanges provide an additional trading window, which gives one time facility for small investors to sell physical shares which are in compulsory demat list. The buyer of these shares has to demat such shares before further selling.

Opening of BO Account by non body corporate-Proof of Identity (PoI):

Permanent Account Number (PAN) to be the sole identification number for all transactions in the securities market. With effect from July 02, 2007, PAN is the sole identification number for all transactions in the securities market, irrespective of the amount of transaction. A copy of the PAN card with photograph may be accepted as Proof of Identity. In this regard, intermediaries shall:

- a) Put necessary systems in place so that the databases of the clients and their transactions are linked to the PAN details of the client.
- b) Build necessary infrastructure to enable accessibility and query based on PAN thereby enabling retrieval of all the details of the clients.
- c) Collect copies of PAN cards issued to the existing as well as new clients by the Income Tax Department and maintain the same in their record after verifying with the original.
- d) Cross-check the aforesaid details collected from their clients with the details on the website of the Income Tax Department.

All applicants should carry original documents for verification by an authorized official of the DP, under his signature.

SEBI has rationalised the cost structure for dematerialisation by removing account opening charges, transaction charges (for credit or buy transactions of securities), custody charges and account closing charges. Custody charges are now paid by the issuer companies. Broadly, investors are required to pay the charges towards:

- ❖ Dematerialisation and Rematerialisation of their securities
- ❖ Annual account maintenance charges

- ❖ Transactions fees (only for sell transactions)

The DP may revise the charges by giving 30 days notice in advance.

5.6.4 Merits and Demerits of Depository system of recording shares and trading in shares and securities:

(A) Advantages:

- 1) **Immediate Transfer and Registration:** In the depository environment, once the securities are credited to the investors account on payout, he becomes the legal owner of the securities, without any requirement to register with the Company's Registrar. Securities are held in a safe and convenient manner.
- 2) **Short Settlement cycle:** The exclusive demat segments follow rolling settlement cycle of T + 2, i.e. the settlement of trades will be on the 2nd working day from the trade day. This will enable faster turnover of stock, faster disbursement of non-cash corporate benefits like rights, bonus, etc. and also more liquidity with the investor.
- 3) **Low Transaction Cost:**
 - a) **No Stamp Duty:** No stamp duty attached to any kind of securities in the depository. This waiver extends to Equity Shares, Debt Instruments and Units of Mutual Funds, thereby lowering the transaction cost / charges.
 - b) **Lower Operating Cost:** Depository System provides the benefit of dealing in dematerialized securities and hence reduces the cost of back office cost of handling paper and also eliminates the risk of introducing the Broker.
- 4) **Reporting:** Depository System facilitates obtaining periodic status reports to investors on their holdings and transactions, leading to better controls.
- 5) **Elimination of bad deliveries:** In a depository environment, once holdings of an investor are dematerialized, the question of bad delivery does not arise, i.e. they cannot be held "under objection".
- 6) **Elimination of Risks:** The risk of theft of stocks, mutilation of certificates, loss of certificates during movements, etc. does not arise in case of dealing in Securities through Depository System.
- 7) **Single Point Interface:**
 - a) Depository System eliminates the cumbersome procedure in connection with change of address or transmission of demat shares. Investors have to only inform their Depository Participant (DP) with all relevant documents and the required changes are effected in the database of all the companies, where the investor is a registered holder of securities.
 - b) There is automatic credit into the demat account of shares, arising out of bonus / split / consolidation/ merger etc.
 - c) There is ease in portfolio monitoring, since statement of account gives a consolidated position of investments in all instruments.

(B) Disadvantages:

- 1) **System Failure:** Input control, process control and output control apply equally to the dematerialization process as they do to any computerized environment. Unforeseen Errors and Frauds, on the part of the individuals entrusted with protecting data integrity, could lead to chaos and Heavy Financial Losses.
- 2) **Additional record keeping:** In built provisions for Rematerialisation exist to take care of the needs of individuals who wish to hold securities in physical form. Companies will invariably need to maintain records on a continuous basis for securities held in physical form. Periodical reconciliation between DEMAT segment and physical segment becomes necessary.



- 3) **Additional Costs:** For transacting business, investors have to deal not only with brokers but also with Depository Participant which thus adding to the list of intermediaries. A onetime fee is levied by the Depository Participant which small investors consider to be an avoidable cost.
- 4) **Fraud:** Dematerialization is not a remedy for all ills. Unlawful transfers by individuals against whom insolvency proceedings are pending or transfers by attorney holders with specific or limited powers are possible as in any physical transaction.

5.7 INITIAL PUBLIC OFFER (IPO)/ FOLLOW ON PUBLIC OFFER (FPO); BOOK BUILDING

5.7.1 Initial Public Offer (IPO):

An initial public offering (IPO) or stock market launch is a type of public offering where shares of stock in a company are sold to the general public, on a securities exchange, for the first time. Through this process, a private company transforms into a public company. It is an offering of either a fresh issue of securities or an offer for sale of existing securities, or both by an unlisted company for the first time to the public. Initial public offerings are used by companies to raise expansion capital, to possibly monetize the investments of early private investors, and to become publicly traded enterprises. A company selling shares is never required to repay the capital to its public investors. After the IPO, when shares trade freely in the open market, money passes between public investors. Although an IPO offers many advantages, there are also significant disadvantages. Chief among these are the costs associated with the process, and the requirement to disclose certain information that could prove helpful to competitors, or create difficulties with vendors. Details of the proposed offering are disclosed to potential purchasers in the form of a lengthy document known as a prospectus. Most companies undertaking an IPO do so with the assistance of an investment banking firm acting in the capacity of an underwriter. Underwriters provide a valuable service, which includes help with correctly assessing the value of shares (share price), and establishing a public market for shares (initial sale). Alternative methods such as the dutch auction have also been explored. In terms of size and public participation, the most notable example of this method is the Google IPO. China has recently emerged as a major IPO market, with several of the largest IPOs taking place in that country.

The SEBI has laid down eligibility norms for entities raising funds through an IPO and an FPO. The entry norms for making an IPO of equity shares or any other security which may be converted into or exchanged with equity shares at a later date are as follows:

- ✓ Entry Norm I- Profitability Route
- ✓ Entry Norm II- QIB Route
- ✓ Entry Norm III- Appraisal Route

However, the SEBI has exempted the following entities from entry norms:

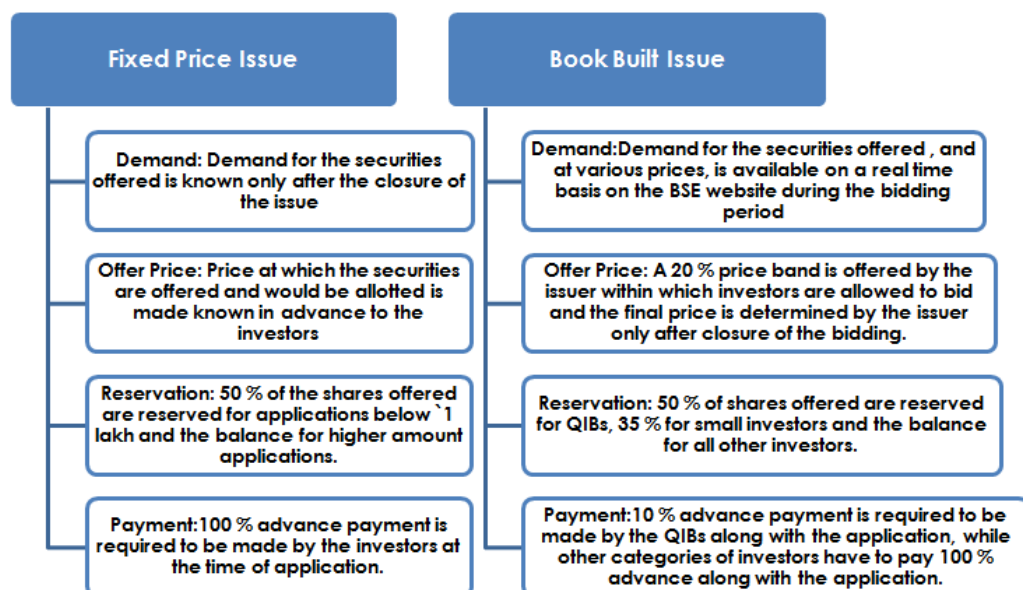
- ❖ Private sector banks.
- ❖ Public sector banks.
- ❖ An infrastructure company whose project has been appraised by a PFI or IDFC or IL&FS or a bank which was earlier a PFI and not less than 5 per cent of the project cost is financed by any of these institutions.
- ❖ Rights issue by a listed company.

A company cannot make a public or rights issue of debt instruments unless it fulfills the following two conditions: credit rating of not less than investment grade is obtained from not less than two SEBI registered credit rating agencies and it should not be in the list of willful defaulters of the Reserve Bank. Moreover, it should not have defaulted payment of interest or repayment of principal, if any, for a period of more than six months.

The IPO process in India consists of the following steps:

- ❖ Appointment of merchant banker and other intermediaries
- ❖ Registration of offer document
- ❖ Marketing of the issue
- ❖ Post- issue activities

Allotment to various investor categories:



5.7.2 Follow On Public Offer (FPO):

A follow-on offering (often but incorrectly called secondary offering) is an offer of sale of securities by a listed company. A follow-on offering can be either of two types (or a mixture of both): dilutive and non-dilutive. A secondary offering is an offering of securities by a shareholder of the company (as opposed to the company itself, which is a primary offering). A follow on offering is preceded by release of prospectus similar to IPO: a Follow-on Public Offer (FPO).

For example, Google's initial public offering (IPO) included both a primary offering (issuance of Google stock by Google) and a secondary offering (sale of Google stock held by shareholders, including the founders).

In the case of the dilutive offering, the company's board of directors agrees to increase the share float for the purpose of selling more equity in the company. This new inflow of cash might be used to pay off some debt or used for needed company expansion. When new shares are created and then sold by the company, the number of shares outstanding increases and this causes dilution of earnings on a per share basis. Usually the gain of cash inflow from the sale is strategic and is considered positive for the longer term goals of the company and its shareholders. Some owners of the stock however may not view the event as favorably over a more short term valuation horizon.

One example of a type of follow-on offering is an at-the-market offering (ATM offering), which is sometimes called a controlled equity distribution. In an ATM offering, exchange-listed companies incrementally sell newly issued shares into the secondary trading market through a designated broker-dealer at prevailing market prices. The issuing company is able to raise capital on an as-needed basis with the option to refrain from offering shares if unsatisfied with the available price on a particular day.



The non-dilutive type of follow-on offering is when privately held shares are offered for sale by company directors or other insiders (such as venture capitalists) who may be looking to diversify their holdings. Because no new shares are created, the offering is not dilutive to existing shareholders, but the proceeds from the sale do not benefit the company in any way. Usually however, the increase in available shares allows more institutions to take non-trivial positions in the company.

As with an IPO, the investment banks who are serving as underwriters of the follow-on offering will often be offered the use of a green shoe or over-allotment option by the selling company.

A non-dilutive offering is also called a secondary market offering.

Follow on Public offering is different from initial public offering.

- ❖ IPO is made when company seeks to raise capital via public investment while FPO is subsequent public contribution.
- ❖ First issue of shares by the company is made through IPO when company first becoming a publicly traded company on a national exchange while Follow on Public Offering is the public issue of shares for an already listed company.

SEBI has introduced fast track issues (FTI) in order to enable well-established and compliant listed companies satisfying certain specific entry norms/conditions to raise equity through follow-on and rights issues. These norms reduce the process of issue and thereby the time period thus enabling issuers a quick access to primary capital market. Such companies can proceed with follow-on public offers (FPOs)/right issues by filing a copy of Red Herring Prospectus (RHP)/prospectus with the registrar of companies (RoC) or the letter of offer with designated stock exchange (SE), SEBI and stock exchanges. Moreover, such companies are not required to file draft offer document for SEBI comments and to stock exchanges as the relevant information is already in the public domain.

5.7.3 Book Building:

Book-building means a process by which a demand for the securities proposed to be issued by a body corporate is elicited and built up and the price for such securities is assessed for the determination of the quantum of such securities to be issued by means of notice/ circular / advertisement/ document or information memoranda or offer document. It is a mechanism where, during the period for which the book for the offer is open, the bids are collected from investors at various prices, which are within the price band specified by the issuer. The process is directed towards both the institutional as well as the retail investors. The issue price is determined after the bid closure based on the demand generated in the process.

The book-building system is part of Initial Public Offer (IPO) of Indian Capital Market. It was introduced by SEBI on recommendations of Mr. Y.H. Malegam in October 1995. It is most practical, fast and efficient management of Mega Issues. Book Building involves sale of securities to the public and the institutional bidders on the basis of predetermined price range.

- ❖ Book Building is a price discovery mechanism and is becoming increasingly popular as a method of issuing capital. The idea behind this process is to find a better price for the issue.
- ❖ The issue price is not determined in advance. Book Building is a process wherein the issue price of a security is determined by the demand and supply forces in the capital market.
- ❖ Book building is a process used for marketing a public offer of equity shares of a company and is a common practice in most developed countries.
- ❖ Book building is called so because it refers to the collection of bids from investors, which is based on an indicative price range. The issue price is fixed after the bid closing date. The various bids received from the investors are recorded in a book that is why the process is called Book Building.
- ❖ Unlike international markets, India has a large number of retail investors who actively participate in Initial Public Offer (IPOs) by companies. Internationally, the most active investors are the mutual

funds and other institutional investors, hence the entire issue is book built. But in India, 25 per cent of the issue has to be offered to the general public. Here there are two options with the company.

- ❖ An issuer company may make an issue of securities to the public through a prospectus in the following manner :
 - ✓ 100% of the net offer to the public through the book building process, or
 - ✓ 75% of the net offer to the public through the book building process and 25% at the price determined through the book building.

Book Building Process:

1. The issuer company shall appoint an eligible Merchant Banker(s) as book runner(s) and their name(s) shall be mentioned in the draft prospectus submitted to SEBI.
2. The issuer company shall enter into an agreement with one or more of the Stock Exchange(s) which have the requisite system of online offer of securities.
3. The draft prospectus shall be filed with SEBI by the Lead Merchant Banker as per the SEBI Regulations containing all the disclosures except that of price and the number of securities to be offered to the public.
4.
 - a) The Book Runner(s)/syndicate members shall appoint brokers of the exchange, who are registered with SEBI, for the purpose of accepting bids, applications and placing orders with the company and ensure that the brokers so appointed are financially capable of honouring their commitments arising out of defaults of their clients/investors, if any.
 - b) The brokers so appointed, accepting applications and application monies, shall be considered as 'bidding/collection centres'.
 - c) The brokers so appointed, shall collect the money from his/their client for every order placed by him/them and in case the client/investor fails to pay for shares allocated as per the Regulations, the broker shall pay such amount.
 - d) The company shall pay to the broker(s) a commission/fee for the services rendered by him/them.
 - e) The Red herring prospectus shall disclose, either the floor price of the securities offered through it or a price band along with the range within which the price can move, if any. However, the issuer may not disclose the floor price or price band in the red herring prospectus if the same is disclosed in case of an IPO, at least two working days before the opening of the bid and in case of an FPO, at least one working day before the opening of the bid, by way of an announcement in all the newspapers in which the pre-issue advertisement was released by the issuer or the merchant banker.
 - f) In case the red herring prospectus discloses the price band, the lead book runner shall ensure compliance with the following conditions:
 - i) The cap of the price band should not be more than 20% of the floor of the band; i.e., cap of the price band shall be less than or equal to 120% of the floor of the price band.
 - ii) The price band can be revised during the bidding period in which case the maximum revision on either side shall not exceed 20% i.e., floor of the price band can move up or down to the extent of 20% of floor of the price band disclosed in the red herring prospectus and the cap of the revised price band will be fixed in accordance with clause (i) above.
 - iii) Any revision in the price band shall be widely disseminated by informing the stock



exchanges, by issuing press release and also indicating the change on the relevant website and the terminals of the syndicate members.

- iv) In case the price band is revised, the bidding period shall be extended for a further period of three days, subject to the total bidding period not exceeding thirteen days.
5. The issuer company shall after receiving the final observations, if any, on the offer document from SEBI make an advertisement in an English National daily with wide circulation, one Hindi National newspaper and Regional language newspaper with wide circulation at the place where the registered office of the Issuer company is situated.
6. Bids shall be open for at least 3 working days and not more than 7 working days, which may be extended to a maximum of 10 working days in case the price band is revised.
7. RILs may bid at 'cut-off' price instead of their writing the specific bid prices in the bid forms.
8. Once the final price is determined, all those bidders whose bids have been found to be successful shall become entitled for allotment of securities.
9. The broker may collect an amount to the extent of 100% of the application money as margin money from the clients/investors before he places an order on their behalf.
10. Additional Disclosures:
 - a) The particulars of syndicate members, brokers, registrars, bankers to the issue, etc.
 - b) Statement to be given under the 'basis for issue price'

'The issue price has been determined by the Issuer in consultation with the Book Runner(s), on the basis of assessment of market demand for the offered securities by way of book-building.'
 - c) The following accounting ratios shall be given under the basis for issue price for each of the accounting periods for which the financial information is given:
 - i) EPS, pre-issue, for the last three years.
 - ii) P/E pre-issue.
 - iii) Average return on net worth in the last three years.
 - iv) Comparison of all the accounting ratios of the issuer company as mentioned above with the industry average and with the accounting ratios of the peer group.
11. On determination of the entitlement under clause 6, the information regarding the same (i.e., the number of securities to which the investor becomes entitled) shall be intimated immediately to the investors.
12. The final prospectus containing all disclosures as per SEBI Guidelines including the price and the number of securities proposed to be issued shall be filed with the ROC.
13. The investors who had not participated in the bidding process or have not received intimation of entitlement of securities under clause 8 may also make an application.
14. In case an issuer company makes an issue of 100% of the net offer to public through 100% Book Building process:
 - 50% of shares offered are reserved for QIBs, not less than 35% for small investors and the balance (not less than 15%) for all other investors (i.e., non-institutional investors).

Provided that, 50% of the issue size shall be mandatorily allotted to the QIBs in case of compulsorily book built issues, failing which the full subscription monies shall be refunded.

In case the book built issues are made pursuant to the requirement of mandatory allocation of

60% to QIBs in terms of Rule 19(2)(b) of Securities Contract (Regulation) Rules, 1957, the respective figures are 30% for RILs and 10% for NILs.

15. The company, Lead Manager/Book Runner shall announce the pay-in day and intimate the same to brokers and stock exchange. It shall be responsibility of the broker to deposit the amount in the Escrow Account to the extent of allocation to his clients on the pay-in date.
16. On receipt of the basis of allocation data, the brokers shall immediately intimate the fact of allocation to their client/applicant.
17. The broker shall refund the margin money collected earlier, within 3 days of receipt of basis of allocation, to the applicants who did not receive allocation.
18. The brokers shall give details of the amount received from each client/investor and the names of clients/investors who have not paid the application money to Registrar/Book Runner and to the exchange.
19. Trading shall commence within 6 days from the closure of the issue failing which interest @ 15% p.a. shall be paid to the investors.

Advantages of Book Building:

1. The book building process helps in discovery of price & demand.
2. The costs of the public issue are much reduced.
3. The time taken for the completion of the entire process is much less than that in the normal public issue.
4. In book building, the demand for the share is known before the issue closes. Infact, if there is not much demand, the issue may be deferred.
5. It inspires investors confidence leading to a large investor universe.
6. Issuers can choose investors by quality.
7. The issue price is market determined.

Disadvantages of Book Building:

1. There is a possibility of price rigging on listing as promoters may try to bail out syndicate members.
2. The book building system works very efficiently in matured market conditions. But, such conditions are not commonly found in practice.
3. It is appropriate for the mega issues only.
4. The company should be fundamentally strong & well known to the investors without it book building process will be unsuccessful.

Recent Example: Recent example of a book building process in Indian context is the IPO of Reliance Power. The issue was made through 100 % book building process. The price band for the book building process was between ₹405 and ₹450 with ₹20 discount for retail investors.

Reverse Book Building:

It is method of buy-back of securities. It is an efficient price discovery mechanism adopted when the company aims to buy the Shares from the public and other Shareholders. This is generally done when the company wishes to delist itself from the trading exchanges.

Process for Reverse Book Building:

- ❖ The acquiring company secures board and shareholders approval to delist the shares.
- ❖ The acquirer shall appoint a designated BRLM to execute the process.



- ❖ The BRLM decides the floor price and the dates for inviting bids from the shareholders. The floor price shall not be less than the following: (a) where the equity shares are frequently traded in all the recognised stock exchanges where they are listed, the average of the weekly high and low of the closing prices of the equity shares of the company during the 26 weeks or 2 weeks preceding the date on which the recognised stock exchanges were notified of the board meeting in which the delisting proposal was considered, whichever is higher, as quoted on the recognised stock exchange where the equity shares of the company are most frequently traded; (b) where the equity shares of the company are infrequently traded in all or some of the recognised stock exchanges, the floor price shall be determined by the BRLM taking into account the following factors: (i) the highest price paid by the promoter for acquisitions, if any, of equity shares of the class sought to be delisted, including by way of allotment in a public or rights issue or preferential allotment, during the 26 weeks period prior to the date on which the recognised stock exchanges were notified of the board meeting in which the delisting proposal was considered and after that date upto the date of the public announcement; and, (ii) other parameters including return on net worth, book value of the shares of the company, earning per share, price earning multiple vis-a-vis the industry average.
- ❖ The acquiring company shall, upon receipt of in principle approval for delisting from the recognised stock exchange, make a public announcement in at least one English national daily with wide circulation, one Hindi national daily with wide circulation, and one regional language newspaper of the region where the concerned recognised stock exchange is located.
- ❖ Before making the public announcement, the acquiring company shall open an escrow account and deposit therein the total estimated amount of consideration calculated on the basis of floor price and number of equity shares outstanding with public shareholders. The escrow account shall consist of either cash deposited with a scheduled commercial bank, or a bank guarantee in favour of the merchant banker, or a combination of both.
- ❖ The acquiring company shall despatch the letter of offer to the public shareholders of equity shares, not later than 45 working days from the date of the public announcement, so as to reach them at least 5 working days before the opening of the bidding period. The letter of offer shall be sent to all public shareholders holding equity shares of the class sought to be delisted whose names appear on the register of the company or depository as on the date specified in the public announcement.
- ❖ The date of opening of the offer shall not be later than 55 working days from the date of the public announcement. The offer shall remain open for a minimum period of three working days and a maximum period of five working days, during which the public shareholders may tender their bids.
- ❖ Bidding will be done only in the electronic form and through the stock exchanges trading mechanism.
- ❖ The holders of physical equity shares may send their bidding form together with the share certificate and transfer deed to the trading member appointed for the purpose, who shall immediately after entering their bids on the system send them to the company or the share transfer agent for confirming their genuineness. The company or the share transfer agent shall deliver the certificates which are found to be genuine to the merchant banker, who shall not make it over to promoter unless the bids in respect thereof are accepted and payment made. The bids in respect of the certificates which are found to be not genuine shall be deleted from the system.
- ❖ The BRLM will give the list of trading members who are eligible to participate in the reverse book building process to the stock exchange.
- ❖ Bids will be placed through trading members at the bidding centres, whom the public shareholders may approach for placing bids on the on-line electronic system and will have to be made at or above the floor price.

- ❖ There is no cap on the bid price and revision of bids is possible. The shareholders may withdraw or revise their bids upwards not later than one day before the closure of the bidding period. Downward revision of bids is not permitted.
- ❖ The acquiring company shall not be bound to accept the equity shares at the offer price determined by the book building process. Where the acquiring company decides not to accept the offer price so determined,
 - ✓ the company shall not acquire any equity shares tendered pursuant to the offer and the equity shares deposited or pledged by a shareholder shall be returned or released to him within ten working days of closure of the bidding period;
 - ✓ the company shall not make the final application to the exchange for delisting of the equity shares;
 - ✓ the promoter may close the escrow account;
 - ✓ in a case where the public shareholding at the opening of the bidding period was less than the minimum level of public shareholding required under the listing agreement, the acquiring company shall ensure that the public shareholding shall be brought up to such minimum level within a period of six months from the date of closure of the bidding.
- ❖ Within eight working days of closure of the offer, the BRLM shall make a public announcement in the same newspapers in which the public announcement was made regarding:
 - ✓ the success of the offer along with the final price accepted by the acquirer; or
 - ✓ the failure of the offer
 - ✓ rejection of the final price discovered by the promoters.
- ❖ Where, pursuant to acceptance of equity shares tendered in terms of these regulations, the equity shares are delisted, any remaining public shareholder holding such equity shares may tender his shares to the promoter upto a period of at least one year from the date of delisting and, in such a case, the promoter shall accept the shares tendered at the same final price at which the earlier acceptance of shares was made. The payment of consideration for shares accepted shall be made out of the balance amount lying in the escrow account.

The reverse book building route is a difficult and costly process. Price discovery is a problem in case of small companies as their shares are thinly traded, making it difficult to delist through the reverse book building route. Unless the shares are delisted, the small companies have to pay all listing charges.

5.8 AUCTION & INSIDER TRADING

5.8.1 Auction

The various auction methods in securities market are:

1. **Yield Based Auction:** A yield based auction is generally conducted when a new Government security is issued. Investors bid in yield terms up to two decimal places (for example, 8.19 per cent, 8.20 per cent, etc.). Bids are arranged in ascending order and the cut-off yield is arrived at the yield corresponding to the notified amount of the auction. The cut-off yield is taken as the coupon rate for the security. Successful bidders are those who have bid at or below the cut-off yield. Bids which are higher than the cut-off yield are rejected.
2. **Price Based Auction:** A price based auction is conducted when Government of India re-issues securities issued earlier. Bidders quote in terms of price per ₹100 of face value of the security (e.g., ₹102, ₹101, ₹100, ₹99, etc., per ₹100). Bids are arranged in descending order and the successful bidders are those who have bid at or above the cut-off price. Bids which are below the cut-



off price are rejected. Depending upon the method of allocation to successful bidders, auction could be classified as **Uniform Price** based and **Multiple Price** based.

- i) **Uniform Price Based or Dutch Auction:** All the successful bidders are required to pay for the allotted quantity of securities at the same rate, i.e., at the auction cut-off rate, irrespective of the rate quoted by them. This method is followed in the case of 91 days treasury bills only.
- ii) **Multiple Price Based or French Auction:** All bids equal to or above the cut-off price are accepted. However, the successful bidders are required to pay for the allotted quantity of securities at the respective price/yield at which they have bid. This method is followed in the case of 364 days treasury bills and is valid only for competitive bidders. An investor may bid in an auction under either of the following categories:
 - ✓ **Competitive Bidding:** In a competitive bidding, an investor bids at a specific price / yield and is allotted securities if the price / yield quoted is within the cut-off price / yield. Competitive bids are made by well informed investors such as banks, financial institutions, primary dealers, mutual funds, and insurance companies. The minimum bid amount is ₹10,000 and in multiples of ₹10,000 thereafter. Multiple bidding is also allowed, i.e., an investor may put in several bids at various price/ yield levels.
 - ✓ **Non-Competitive Bidding:** With a view to providing retail investors, who may lack skill and knowledge to participate in the auction directly, an opportunity to participate in the auction process, the scheme of non-competitive bidding in dated securities was introduced in January 2002. Non-competitive bidding is open to individuals, HUFs, RRBs, co-operative banks, firms, companies, corporate bodies, institutions, provident funds, and trusts. Under the scheme, eligible investors apply for a certain amount of securities in an auction without mentioning a specific price / yield. Such bidders are allotted securities at the weighted average price / yield of the auction. The participants in non-competitive bidding are, however, required to hold a gilt account with a bank or PD. Regional Rural Banks and co-operative banks which hold SGL and Current Account with the RBI can also participate under the scheme of non-competitive bidding without holding a gilt account. The minimum amount and the maximum amount for a single bid is ₹10,000 and ₹2 crore respectively in the case of an auction of dated securities.

5.8.2 Insider Trading

Insider Trading is the use of confidential information about a business gained through employment in a company or a stock brokerage, to buy and/or sell stocks and bonds based on the private knowledge that the value will go up or down.

It is buying or selling or dealing in securities of a Listed company by Director, Member of Management, an Employee or any other person such as Internal or Statutory Auditor, Agent, Advisor, Analyst Consultant etc. who have knowledge of material, 'inside' information not available to general public.

Illegal: Dealing in securities by an insider is illegal when it is predicated upon utilization of inside information to profit at the expense of other investors who do not have access to such investment information. It is prohibited and is considered as an offence as per SEBI (Insider Trading) Regulations, 1992.

Punishable: Insider trading is an unethical practice resorted to by those in power, causing huge losses to common investors thus driving them away from capital market, and hence punishable.

Two decades have passed since the SEBI (Prohibition of Insider Trading) Regulations, 1992 were notified which was framed to deter the practice of insider trading in the securities of listed companies. Since then there have been several amendments to the Regulations and judicial paradigm through case laws have also evolved in India. In fact, world over, the regulatory focus is shifting towards containing the rising menace of insider trading effectively. To ensure that the regulatory framework dealing with insider trading in India is further strengthened, SEBI seeks review of the extant Insider Trading Regulatory regime in India.

The Securities and Exchange Board of India (Prohibition of Insider Trading) Regulations 1992 requires that a person who is connected with a listed company and is in possession of any unpublished price sensitive information likely to materially affect the price of securities of company, shall not:

- i) On his behalf or on behalf of any other person deal in securities or
- ii) Communicate such information to any other person, who while in possession of such information shall not deal in securities.

Accordingly, SEBI has constituted a High Level Committee under the Chairmanship of Hon'ble Justice Mr. N. K. Sodhi, retired Chief Justice of Karnataka High Court and Former Presiding officer of the Securities Appellate Tribunal, for reviewing the SEBI (Prohibition of Insider Trading) Regulations, 1992.

5.9 CREDIT RATING - OBJECTIVES, SOURCES, PROCESS, CREDIT RATING AGENCIES IN INDIA

Credit Rating is the assessment of a borrower's credit quality. It is the assessment carried out from the viewpoint of credit-risk evaluation on a specific date, on the quality of a-

- ❖ Specific debt-security issued, or
- ❖ Obligation undertaken by an enterprise (Term Loans, etc.)

Areas of Assessment: Assessment is done on the:-

- ❖ **Ability:** Financial Strength,
- ❖ **Willingness:** Integrity and Attitude,

of the obligant to meet principal and interest payments on the rated debt instrument in a timely manner.

Need for Credit Rating: A Firm has to ascertain the credit rating of prospective customers, to ascertain how much and how long can credit be extended. Credit can be granted only to a customer who is reliably sound. This decision would involve analysis of the financial status of the party, his reputation and previous record of meeting commitments.

Feature: Ratings are expressed in alphabetical or alphanumeric symbols, enabling the investor to differentiate between debt instruments based on their underlying credit quality.

Credit Rating do not measure the following-

- 1) **Investment Recommendation:** Credit Rating does not make any recommendation on whether to invest or not.
- 2) **Investment Decision:** They do not take into account the aspects that influence an investment decision.
- 3) **Issue Price:** Credit Rating does not evaluate the reasonableness of the issue price, possibilities for capital gains or liquidity in the secondary market.
- 4) **Risk of Prepayment:** Ratings do not take into account the risk of prepayment by issuer, or interest or exchange risks.
- 5) **Statutory Compliance:** Credit Rating does not imply that there is absolute compliance of statutory requirements in relation to Audit, Taxation, etc. by-the issuing company.

Objectives:

- 1) To maintain investors' confidence.
- 2) To protect the interest of investors.
- 3) To provide low cost and reliable information to the investors in debt securities.
- 4) To act as a tool for marketing of debt securities.



- 5) To improve a healthy discipline on borrowers.
- 6) To help merchant bankers, financial intermediaries and regulatory authorities in discharging their functions related to the issue of debt securities.
- 7) To provide greater financial and accounting information of the issuers of securities to the investors.
- 8) To facilitate and formulate public guidelines on institutional investment.
- 9) To reduce interest costs for highly rated companies.
- 10) To motivate savers to invest in debt securities for the development of trade and industry.

Benefits:

Guidance to Investors: To provide guidance to investors / creditors in determining a credit risk associated with a debt instrument / credit obligation.

- a) **Current Opinion on Credit Risk:** Credit Rating is based on the relative capability and willingness of the issuer of the instrument to service the debt obligations (both principal and interest) as per the terms of the contract. Thus, it acts as an indicator of the current opinion of the credit risk and can be changed from time to time.
- b) **Relative Ranking:** Credit Rating ranks the fixed income investment based on the probability of it (Investment / Instrument) defaulting, in comparison with other rated instruments.

Limitations:

- a) **Rating Changes:** Rating given to instruments can change over a period of time. They have to be kept under rating watch. Downgrading of an instrument may not be timely enough to help investors.
- b) **Industry Specific rather than Company Specific:** Downgrades are linked to industry rather than company performance. Agencies give importance to macro aspects and not to micro ones; over react to existing conditions which come from optimistic / pessimistic views arising out of up / down turns.
- c) **Cost - Benefit of Rating:** Ratings being mandatory, it becomes a must for entities rather than carrying out Cost Benefit Analysis of obtaining such, ratings. Rating should be optional and the entity should be free to decide on the issue of obtaining a credit rating.
- d) **Conflict of Interest:** The rating agency collects fees from the entity it rates leading to a conflict of interest. Rating market being competitive there is a possibility of such conflict entering into the rating system especially in a case where the rating agencies get their revenues from a single service or group.
- e) **Transparency:** Greater transparency in the rating process should exist an example being the disclosure of assumptions leading to a specific public rating.

Various sources of Credit Rating information:

The following are the important sources of credit information-

- 1) **Trade References:** Prospective customer may be required to give 2 or 3 trade references. Thus, the customers may give a list of personal acquaintances or some other existing credit-worthy customers. The Credit Manager can send a short questionnaire, seeking relevant information, to the referees.
- 2) **Bank references:** Customer requests his banker to provide the required information to the rating agencies.
- 3) **Credit Bureau Reports:** Associations for specific industries may maintain a credit bureau which provide useful and authentic credit information for their members.

- 4) **Past experience:** Past experience of dealings with an existing customer also provides requisite information. The transactions should be carefully scrutinised and interpreted in light of changes in the ensuing period for finding out the credit risk involved.
- 5) **Published Financial Statements:** Published Financial Statements of a customer, read along with its Audit Report and Observations, (in case of limited Companies) can be examined to determine the creditworthiness.
- 6) **Reports from Point of Sale:** Credit-worthiness can be evaluated by the reports provided by consulting salesmen or persons engaged at the point of sale. Such reports provide first hand information to the Company for proper determination of the credit limit.
- 7) **Reports from other agencies:** Non-Banking Financial Companies (Leasing Companies, etc.) may maintain a list of defaulting customers / suit-filed cases, etc. Sometimes, this information may also be obtained by other Companies on request basis. Credit Information Bureau of India Limited (CIBIL) is one entity which maintains a detailed list of defaulters.

Process of Credit Rating:

The steps involved in the Credit Rating are:

- 1) **Rating Request:** The Customer (prospective issuer of Debt Instrument) makes a formal request to the Rating Agency. The request spells out the terms of the rating assignment and contains analysis of the issues viz. historical performance, competitive position, business risk profile, business strategies, financial policies and evaluation of outlook for performance. Information requirements are met through various sources like references, reviews, experience, etc.
- 2) **Formation of Rating Team:** The Credit Rating Agency forms a team, whose composition is based on the expertise and skills required for evaluating the business of the Issuer.
- 3) **Initial Analysis:** On the basis of the information gathered, the analysts submit the report to the Rating team. The authenticity and validity of the information submitted influences the credit rating activity.
- 4) **Evaluation by Rating Committee:** Rating Committee is the final authority for assigning ratings. The rating team makes a brief presentation about the issuers' business and the management. All the issues identified during discussions stage are analysed.
- 5) **Actual Rating:** Rating is assigned and all the issues, which influence the rating, are clearly spelt out.
- 6) **Communication to Issuer:** Assigned rating together with the key issues is communicated to the issuer's top management for acceptance. The ratings, which are not accepted, are either rejected or reviewed. The rejected ratings are not disclosed and complete confidentiality is maintained.
- 7) **Review of Rating:** If the rating is not acceptable to the issuer, he has a right to appeal for a review of the rating. These reviews are usually taken up, only if the issuer provides fresh inputs on the issues that were considered for assigning the rating. Issuer's response is presented to the Rating Committee. If the inputs are convincing, the Committee can revise the initial rating decision.
- 8) **Surveillance / Monitoring:** Credit Rating Agency monitors the accepted ratings over the tenure of the rated instrument. Ratings are reviewed every year, unless warranted earlier. During this course, the initial rating could be retained, upgraded or downgraded.

Credit Rating Symbols in India:

Credit rating agencies generally use symbols to express the creditworthiness rather than give marks or descriptive credit opinion. Rating symbols indicate relative creditworthiness of securities within a defined frame of reference. A simple alphanumeric symbol is normally used to convey a credit rating. The credit rating agencies of India assign the following ratings to the companies:

- 1) AAA- Highest Safety



- 2) AA- High Safety
- 3) A- Adequate Safety
- 4) BBB- Moderate Safety
- 5) BB- Inadequate Safety
- 6) B- High Risk
- 7) C- Substantial Risk
- 8) D- Default Risk

Various Credit Rating Agencies in India:

There are five credit rating agencies registered with the SEBI. They are outlined as follows:

1. CRISIL Limited (Formerly the Credit Rating Information Services of India Limited) :-

- a) CRISIL is the oldest rating agency originally promoted by ICICI.
- b) **Services Offered:** CRISIL offers a comprehensive range of integrated product and service offerings - real time news, analyzed data, opinion and expert advice - to enable investors, issuers, policy makers de-risk their business and financial decision making, take informed investment decisions and develop workable solutions.
- c) **Risk Standardisation:** CRISIL helps to understand, measure and standardise risks - financial and credit risks, price and market risks, exchange and liquidity risks, operational, strategic and regulatory risks.

2. ICRA Limited (Formerly Investment Information and Credit Rating Agency of India) –

- a) ICRA is an independent and professional Company, providing investment information and credit rating services.
- b) **Activities:** ICRA executes assignments in credit ratings, equity grading, and mandated studies spanning diverse, industrial sectors. ICRA has broad based its services to the corporate and financial sectors, both in India and overseas and offers its services under three banners namely- Rating Services, Information Services, Advisory Services.

3. CARE (Credit Analysis and Research Limited) –

- a) CARE is equipped to rate all types of debt instruments like Commercial Paper, Fixed Deposit, Bonds, Debentures and Structured Obligations.
- b) **Services:** CARE's Information and Advisory services group prepares credit reports on specific requests from banks or business partners, conducts sector studies and provides advisory services in the areas of financial restructuring, valuation and credit appraisal systems.

4. Fitch Ratings India Private Limited: Fitch Rating India was formerly known as DCR India- Duff and Phelps Credit Rating Co. Fitch Ratings, USA and DCR India merged to form a new entity called Fitch India. Fitch India is a 100% subsidiary of Fitch Ratings, USA and is the wholly owned foreign operator in India. Fitch is the only international rating agency with a presence on the ground in India. Fitch Rating India rates corporates, banks, financial institutions, structured deals, securitized paper, global infrastructure and project finance, public finance, SMEs, asset management companies, and insurance companies.

5. Brickwork Ratings: It is the fifth agency in the ratings business which commenced its activities from September 24, 2008. It rates IPOs, perpetual bonds of banks, non-convertible debenture issues, and certificate of deposits.

Study Note - 6

TYPES OF FINANCIAL RISKS



This Study Note includes

- 6.1 Financial Risk – Meaning and Nature**
- 6.2 Asset Backed Risk, Credit Risk, Liquidity Risk, Operational Risk**
- 6.3 Foreign Investment Risk & Market Risk**
- 6.4 Financial Risk Identification based on the Balance Sheet Information**

6.1 FINANCIAL RISK – MEANING AND NATURE

Financial risk can best be thought of as the variability in cash flows and market values caused by unpredictable changes in commodity prices, interest rates and exchange rates. Sometimes, the changes bring “good news”; at other times, “bad news”. Usually, firms are most concerned about bad news outcomes because bad news events can severely damage the financial viability of the company and its competitive position in product and labour markets. So, firms often concentrate their risk management efforts on reducing the company's likelihood of experiencing financial distress while maintaining the company's ability to take advantage of any specialized skills or internalized knowledge management has about taking open positions (risk exposures) in certain markets.

Financial risk is caused by changes in commodity prices, interest rates and currency exchange rates that affect the cash flows and market value of a company and, therefore, its financial health and competitive position in product and labour markets. The extent to which a company's cash flows and market value are affected by commodity price, interest rate and exchange rate variability is called its risk exposure and often described as its risk profile. Managing financial risk involves identifying and measuring the company's risk exposure, constructing policies for protecting the firm from financial risk, and then implementing and monitoring those policies.

Nature of Financial Risk:

“The value added of a good risk management system is that you can take more risks.” [Anonymous risk manager, Spring 2007]

One of the paradoxes of the recent global financial crisis is that the crisis erupted in an era when risk management was at the heart of the management of the largest and most sophisticated financial institutions. For institutions who see their role as making money by taking judicious risks, the management of those risks is pivotal in their daily operations. The risk manager quoted above was merely re-affirming the firm's goals. The risk manager's task is to enable the firm to fulfill its purpose by providing the framework for measuring risks accurately, enabling the firm to take advantage of greater precision so as to extract the last ounce of return from the firm's portfolio.

Financial risk is endogenous due in large part to the reasoning embedded in the opening quote. Endogenous risk refers to risks that are generated and amplified within the financial system, rather than risks from shocks that arrive from outside the financial system. The precondition for endogenous risk is the conjunction of circumstances where individual actors react to changes in their environment and where those individuals' actions affect their environment. As we will see in the course of these lectures, the financial system is the supreme example of an environment where individuals react to what's happening around them and where their actions drive the realised outcomes themselves.

Underpinning this two-way flow is the galvanising role of market prices which serves to synchronise and amplify the feedback process. In an era where loans are packaged into securities and balance sheets are continuously marked to market, the galvanising role of market prices reaches into every nook and cranny of the financial system. It will be a central thesis in these lectures that the severity of the global financial crisis is explained in large part by financial development that put marketable assets at the heart of the financial system, and the increased sophistication of financial institutions that held and traded the assets.

Millennium Bridge

But before we deal with the financial system, it is instructive to study the potency of synchronised feedback from an example from outside economics or finance. The saga of the Millennium Bridge in London is a revealing lesson on market failure from outside economics. Many readers will be familiar with the Millennium Bridge. As the name suggests, the bridge was part of the Millennium celebrations in the year 2000. It was the first new crossing over the Thames for over a hundred years, constructed at a cost of \$18 million. The sleek 325 metre-long structure used an innovative “lateral suspension” design, built without the tall supporting columns that are more familiar with other suspension bridges. The vision was of a “blade of light” across the river, connecting St. Paul’s with the new Tate Modern gallery. The bridge was opened by the Queen on a sunny day in June, and the press was there in force. Many thousands of people turned up after the tape was cut and crowded on to the bridge to savour the occasion. However, within moments of the bridge’s opening, it began to shake violently. The shaking was so severe that many pedestrians clung on to the side-rails. The BBC’s website has a page dedicated to the episode and posts some dramatic video news clips of the opening day. The bridge was closed shortly after the opening and was to remain closed for 18 months.

When engineers used shaking machines to send vibrations through the bridge, they found that horizontal shaking at 1 hertz (that is, at one cycle per second) set off the wobble seen on the opening day. Now, this was an important clue, since normal walking pace is around two strides per second, which means that we’re on our left foot every second and on our right foot every second. Walking produces a vertical force (depending on our body mass) of around 750 Newtons or 165 pounds at 2 hertz. However, there is also a small sideways force caused by the sway of our body mass due to the fact that our legs are slightly apart. Anyone who has been on a rope bridge should be well aware of the existence of this sideways force. This force (around 25 Newtons or 5.5 pounds) is directed to the left when we are on our left foot, and to the right when we are on our right foot. This force occurs at half the frequency (or at 1 hertz). This was the frequency that was causing the problems.

But why should this be a problem? We know that soldiers should break step before crossing a bridge. For thousands of pedestrians walking at random, one person’s sway to the left should be cancelled out by another’s sway to the right. If anything, the principle of diversification suggests that having lots of people on the bridge is the best way of cancelling out the sideways forces on the bridge.

Or, to put it another way, what is the probability that a thousand people walking at random will end up walking exactly in step, and remain in lock-step thereafter? It is tempting to say “close to zero”. After all, if each person’s step is an independent event, then the probability of everyone walking in step would be the product of many small numbers - giving us a probability close to zero.

However, we have to take into account the way that people react to their environment. Pedestrians on the bridge react to how the bridge is moving. When the bridge moves from under your feet, it is a natural reaction to adjust your stance to regain balance. But here is the catch. When the bridge moves, everyone adjusts his or her stance at the same time. This synchronised movement pushes the bridge that the people are standing on, and makes the bridge move even more. This, in turn, makes the pedestrians adjust their stance more drastically, and so on. In other words, the wobble of the bridge feeds on itself. When the bridge wobbles, everyone adjusts their stance, which makes the wobble even worse. So, the wobble will continue and get stronger even though the initial shock (say, a small gust of wind) has long passed, as depicted in Figure 1.1.

Arup, the bridge's engineers found that the critical threshold for the number of pedestrians that started the wobble was 156. Up to that number, the movement increased only slightly as more people came on the bridge. However, with ten more people, the wobble increased at a sharply higher rate.

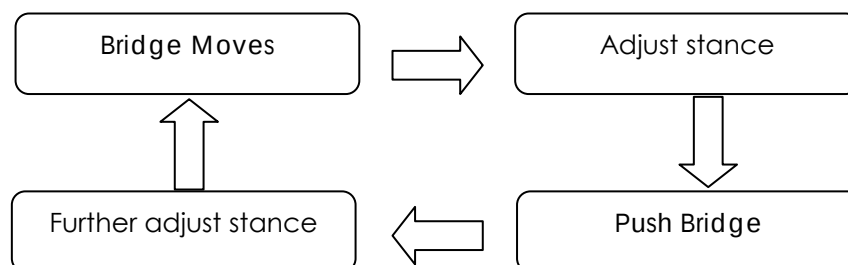


Figure 1.1: Millennium Bridge Feedback

The wobble is an example of a shock that is generated and amplified *within* the system. It is very different from a shock that comes from a storm or an earthquake which come from outside the system. Stress testing on the computer that looks only at storms, earthquakes and heavy loads on the bridge would regard the events on the opening day as a “perfect storm”. But this is a perfect storm that is guaranteed to come every day.

Dual Role of Prices:

What does all this have to do with financial markets? Financial markets are the supreme example of an environment where individuals react to what's happening around them, and where individuals' actions affect the outcomes themselves. The pedestrians on the Millennium Bridge are rather like modern banks that react to price changes, and the movements in the bridge itself are rather like price changes in the market. So, under the right conditions, price changes will elicit reactions from the banks, which move prices, which elicit further reactions, and so on.

Financial development has meant that banks and other financial institutions are now at the cutting edge of price-sensitive incentive schemes and price-sensitive risk-management systems. Mark-to-market accounting ensures that any price change shows up immediately on the balance sheet. So, when the bridge moves, banks adjust their stance more than they used to, and marking to market ensures that they all do so *at the same time*.

The Millennium Bridge example serves to highlight the dual role of prices. Prices play two roles. Not only are they a reflection of the underlying economic fundamentals, they are also an imperative to action. That is, prices induce actions on the part of the economic agents. Some actions induced by price changes are desirable, not only from the point of view of the individual, but from a system perspective, too. However, some actions borne out of binding constraints or actions that exert harmful spillover effects on others are undesirable when viewed from the perspective of the group. It is when the action-inducing nature of price changes elicit harmful spillover effects that the double-edged nature of prices takes on its maximum potency. The problem comes when the *reliance* on market prices *distorts* those same market prices. The more weight is given to prices in making decisions, the greater are the spillover effects that ultimately undermine the integrity of those prices. When prices are so distorted, their allocational role is severely impaired. Far from promoting efficiency, contaminated prices undermine their allocational role.

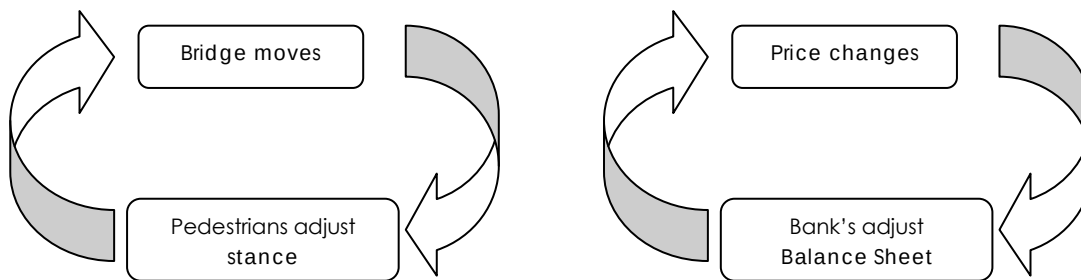


Figure 1.2: Feedback in Financial Systems

Financial crises could almost be defined as episodes where the allocational role of prices break down. The action-inducing role of price changes introduce distortions and cause an amplified spiral of price changes and actions that can cause great damage along the way. Financial crises are often accompanied by large price changes, but large price changes by themselves do not constitute a crisis. Public announcements of important macroeconomic statistics, such as the U.S. employment report, are sometimes marked by large, discrete price changes at the time of announcement. However, such price changes are arguably the signs of a smoothly functioning market that is able to incorporate new information quickly. The market typically finds composure quite rapidly after such discrete price changes.

In contrast, the distinguishing feature of crisis episodes is that they seem to gather momentum from the endogenous responses of the market participants themselves. Rather like a tropical storm over a warm sea, they appear to gather more energy as they develop. As financial conditions worsen, the willingness of market participants to bear risk seemingly evaporates. Such episodes have been dubbed “liquidity black holes”. The terminology is perhaps overly dramatic, but it conveys the sense of free-fall. As prices fall or measured risks rise or previous correlations break down (or some combination of the three), previously overstretched market participants respond by cutting back, giving a further push to the downward spiral. The global financial crisis that erupted in 2007 has served as a live laboratory for many such distress episodes.

Imagine an emerging market country defending a currency peg in adverse circumstances in the face of deteriorating macroeconomic conditions and hostile capital markets. Similar forces operate in more recent crises, including the events surrounding the runs on Bear Stearns and Lehman Brothers in the crisis of 2008. Defending the peg is often dictated by political goals more than economic ones, such as eventual accession to the European Union, the adoption of the euro, or keeping the peg intact in order to shield domestic borrowers who have borrowed in dollars or euros.

However, defending the currency also entails raising interest rates and keeping them high. The costs of defending the currency bear many depressingly familiar symptoms - collapsing asset values and a weakened domestic banking system that chokes off credit to the rest of the economy. Whatever the perceived political benefits of maintaining a currency peg, and whatever their official pronouncements, all governments and their monetary authorities have a pain threshold at which the costs of defending the peg outweigh the benefits of doing so. Speculators understand well that their job is almost done when the finance minister of the stricken country appears on evening television vowing never to devalue the currency. Understanding the source and the severity of this pain is a key to understanding the onset of currency attacks.

Facing the monetary authority is an array of diverse private sector actors, both domestic and foreign, whose interests are affected by the actions of the other members of this group, and by the actions of the monetary authority and government. The main actors are domestic companies and households, domestic banks and their depositors, foreign creditor banks, and outright speculators - whether in the form of hedge funds or the proprietary trading desks of the international banks. Two features stand out, and deserve emphasis.

First, each of these diverse actors faces a choice between actions which exacerbate the pain of maintaining



the peg and actions which are more benign. Second, the more prevalent are the actions which increase the pain of holding the peg, the greater is the incentive for an individual actor to adopt the action which increases the pain. In other words, the actions which tend to undermine the currency peg are mutually reinforcing.

Imagine that we are in Thailand in the early summer of 1997 just prior to the onset of the Asian financial crisis. For domestic financial institutions or companies which had borrowed dollars to finance their operations, they can either attempt to reduce their dollar exposures or not. The action to reduce their exposure - of selling Baht assets to buy dollars in order to repay their dollar loans, for example, is identical in its mechanics (if not in its intention) to the action of a hedge fund which takes a net short position in Baht in the forward market. For domestic banks and finance companies which have facilitated such dollar loans to local firms, they can either attempt to hedge the dollar exposure on their balance sheets by selling Baht in the capital markets, or sitting tight and toughing it out. Again, the former action is identical in its consequence to a hedge fund short-selling Baht. As a greater proportion of these actors adopt the action of selling the domestic currency, the greater is the domestic economic distress, and hence the greater is the likelihood of abandonment of the peg. Everyone understands this, especially the more sophisticated market players that have access to hedging tools. As the pain of holding on to the peg reaches the critical threshold, the argument for selling Baht becomes overwhelming. In this sense, the actions which undermine the currency peg are mutually reinforcing.

The action-inducing nature of price changes turns up in this scenario through balance sheet stress in the twin crisis that combines a banking crisis with a currency crisis. The precipitous decline in the exchange rate means that the Baht value of foreign currency debts balloon past the value of Baht assets that have been financed with such loans. At the same time, the higher domestic interest rates put in place to defend the currency undermine the Baht value of those assets. Assets decline and liabilities increase. Equity is squeezed from both directions. As the Thai Baht collapses, the mutually reinforcing nature of price changes and distressed actions gathers momentum. As domestic firms with dollar liabilities experience difficulties in servicing their debt, the banks which have facilitated such dollar loans attempt to cover their foreign currency losses and improve their balance sheet by a contraction of credit. For foreign creditor banks with short-term exposure, this is normally a cue to cut off credit lines, or to refuse to roll over short term debt. Even for firms with no foreign currency exposure, the general contraction of credit increases corporate distress. Such deterioration in the domestic economic environment exacerbates the pain of maintaining the peg, thereby serving to reinforce the actions which tend to undermine it. To make matters worse still, the belated hedging activity by banks is usually accompanied by a run on their deposits, as depositors scramble to withdraw their money.

To be sure, the actual motives behind these actions are as diverse as the actors themselves. A currency speculator rubbing his hands and looking on in glee as his target country descends into economic chaos has very different motives from a desperate owner of a firm in that country trying frantically to salvage what he can, or a depositor queuing to salvage her meagre life savings. However, whatever the motives underlying these actions, they are identical in their consequences. They all lead to greater pains of holding to the peg, and hence hasten its demise.

Booms

The action-inducing nature of market prices are at their most dramatic during crisis episodes, but arguably they are at their most damaging in boom times when they operate away from the glare of the television cameras. Financial crises don't happen out of the blue. They invariably follow booms. As Andrew Crockett (2000) has put it,

The received wisdom is that risk increases in recessions and falls in booms. In contrast, it may be more helpful to think of risk as increasing during upswings, as financial imbalances build up, and materialising in recessions.

To fully grasp this point, recall the opening quote from the anonymous risk manager who insisted that the value-added of a good risk management system is that one can take more risks. The risk manager was

re-affirming the importance of a framework for measuring risks accurately, thereby enabling the bank to deploy its scarce capital in the most efficient way. During a boom, the action-inducing nature of market prices does their work through the increased capacity of banks to lend. When asset prices rise or measured risks fall, less capital is needed to act as a loss buffer for a given pool of loans or securities. At the same time, higher bank profits also add to the bank's capital. In boom times, banks have surplus capital.

When balance sheets are marked to market, the surplus capital becomes even more apparent. In the eyes of the bank's top management, a bank with surplus capital is like a manufacturing plant with idle capacity. Just as good managers of the manufacturing plant will utilise surplus capacity to expand their business, so the bank's top management will expand its business. If they fail to expand their business, they know that the ranks of bank equity analysts will start to castigate them for failing to achieve the 20% return on equity achieved by some of their peers.

For a bank, expanding its business means expanding its balance sheet by purchasing more securities or increasing its lending. But expanding assets means finding new borrowers. Someone has to be on the receiving end of new loans. When all the good borrowers already have a mortgage, the bank has to lower its lending standards in order to lend to new borrowers. The new borrowers are those who were previously shut out of the credit market, but who suddenly find themselves showered with credit. The ballooning of subprime mortgage lending could be seen through this lens.

The pressure on the bank's managers to expand lending reveals an important feature of the capital constraint facing banks. As with any meaningful economic constraint, the capital constraint binds all the time - in booms as well as in busts. Binding capital constraints during bust phase is well understood. However, less appreciated is the binding nature of the capital constraint in boom times. In boom times, the constraint operates through channels that appear more benign, such as the pursuit of shareholder value by raising return on equity.

The action-inducing effect of market prices derive their potency from the apparently tangible nature of the wealth generated when asset prices appreciate. Consider the following passage from a commentary published in the Wall Street Journal in May 2005, at the height of the housing boom in the United States.

While many believe that irresponsible borrowing is creating a bubble in housing, this is not necessarily true. At the end of 2004, U.S. households owned \$17.2 trillion in housing assets, an increase of 18.1% (or \$2.6 trillion) from the third quarter of 2003. Over the same five quarters, mortgage debt (including home equity lines) rose \$1.1 trillion to \$7.5 trillion. The result: a \$1.5 trillion increase in net housing equity over the past 15 months.

The argument is that when the whole U.S. housing stock is valued at the current marginal transactions price, the total value is \$17.2 trillion (although it was to rise much more subsequently). Although household debt had increased by over a trillion dollars in the meanwhile, this still left them an increase in net worth of \$1.5 trillion.

One can question how tangible this increase in housing wealth is in the face of a possible downturn. But for banks and other financial institutions who mark their balance sheets to market continuously, the increase in marked-to-market equity, is very tangible indeed. The surplus capital generated by asset price appreciation and greater profits weigh on the bank's top management, and induces them to take on additional exposure. Risk spreads fall, and borrowers who did not meet the necessary hurdle begin to receive credit. The seeds of the subsequent downturn are thus sown.

The action-inducing nature of asset price booms is strongest for leveraged institutions such as banks and securities firms since leverage magnifies the increase in marked-to-market equity. Thus, the reasoning quoted above in the Wall Street Journal commentary ripples through the financial system through the actions of leveraged financial institutions.

The classic signs of the late stages of a boom are the compression of risk spreads and the erosion of the price of risk. The phenomenon of "search for yield" often appears in the late stages of a boom as investors migrate down the asset quality curve as risk spreads are compressed. The following commentary from the Bank of England's Financial Stability Review of December 2004 describes the classic symptoms.



"Financial intermediaries and investors appear to have continued their 'search for yield' in a wide range of markets, holding positions that could leave them vulnerable to instability in the pattern of global capital flows and exchange rates, credit events or sharper-than-expected interest rate rises. A number of market participants have also discussed the possibility that risk is being underpriced. In the event of an adverse shock, any over-accumulation of exposures from the mis-pricing of assets may result in an abrupt, and costly, adjustment of balance sheets." [Bank of England (2004, p. 49)]

The double-edged nature of price changes operates in booms as well as in busts, but arguably the biggest damage is done in the boom phase of the financial cycle when the outward signs are benign. The apparent "underpricing of risk" arises as an integral part of a general equilibrium of the economy where financial intermediaries use Value-at-Risk to deploy capital in the most efficient way. In this way, the biggest damage is done in booms, because that is when the worst quality loans are made.

The action-inducing nature of market prices during booms operate away from the glare of the television cameras, and without the chorus of politicians complaining about the effects of mark-to-market accounting rules. But the insidious effects of mark-to-market accounting are at their most potent during the booms. Andrew Crockett's statement that risks increase in booms and materialise in busts is an important lesson that is relevant after each financial crisis. The challenge for policy makers is to reduce the frequency with which we undergo the re-education.

Marking to Market

The double-edged nature of market prices raises important issues for accounting, especially on the role of mark-to-market accounting rules. Some proponents of marking to market like to pose the issues in black and white terms, asking rhetorically, "Do you want the truth, or do you want a lie?"

The unstated assumption behind this rhetorical question is that accounting is just a measurement issue, leaving what is measured completely undisturbed. The assumption is that accounting is just a veil that merely obscures the true economic fundamentals, and that the role of accounting is to shine a bright light into the dark corners of a firm's accounts to illuminate the true state of that firm. In the context of completely frictionless markets, where decision making is done without distorting constraints or inefficient spillover effects, such a world view would be entirely justified.

On the other hand, in such a perfect world, accounting would be irrelevant since reliable market prices would be readily available to all, and it would simply be a matter of reading off the available prices. Just as accounting is irrelevant in such a world, so would any talk of establishing and enforcing accounting standards.

To state the proposition the other way round, accounting is relevant only because we live in an imperfect world, where actions may reflect distorted incentives or self-defeating constraints as well as the hypothetical economic fundamentals. In such an imperfect world, transaction prices may not always be readily available. Even those prices that are available may not correspond to the hypothetical fundamental prices that would prevail in frictionless perfect markets. Therefore, when we debate issues regarding accounting, it is important to be clear on the nature and consequences of the imperfections.

The key to the debate on marking to market is whether mark-to-market accounting injects artificial volatility into transactions prices - an additional, endogenous source of volatility that is purely a consequence of the accounting norm, rather than something that reflects the underlying fundamentals. Real decisions would then be distorted due to the measurement regime. As we have seen from the subprime crisis, distortions to real decisions can sometimes exact very large economic costs.

It is important here to distinguish volatility of prices that merely reflect the volatility of the underlying fundamentals from volatility that cannot be justified by these fundamentals. If the fundamentals themselves are volatile, then market prices will merely reflect the underlying reality. However, the "artificial" nature of the volatility refers to something more pernicious. When the decision horizon of market participants is shortened due to short-term incentives, binding constraints or other market imperfections, then short term price fluctuations affect the interests of these market participants, and hence will influence their

actions. There is then the possibility of a feedback loop where anticipation of short-term price movements will induce market participants to act in such a way as to amplify these price movements. When such feedback effects are strong, then banks' decisions are based on the second-guessing of others' decisions rather than on the basis of perceived fundamentals. In this sense, there is the danger of the emergence of an additional, endogenous source of volatility that is purely a consequence of the accounting norm, rather than something that reflects the underlying fundamentals.

Ultimately, it is important to be clear on the ultimate objectives of the accounting regime. What is the purpose of accounting standards? Whom should they serve? Should they serve the interests of equity investors? Should they serve the interests of a wider class of investors? Or, should we look beyond investors per se to the wider public interest, as for any other public policy issue?

Of course, in practice we may expect wide overlaps between the interests of equity investors, creditors and the wider public interest. However, they are logically distinct, and sometimes lead to very different policy prescriptions. Traditionally, accounting standard setters have not seen their remit extending as far as to take account of the broader public interest. In this respect, accounting may be too important to be left solely to the accountants.

Upward-Sloping Demand Responses

In a boom phase, we can characterise the decisions of a leveraged financial institution as if coming from a decision maker who has become less risk averse, even though the underlying preferences of that institution has remained unchanged. The shift in the "as if" preferences flow from the capital gains of the institution which feeds into an increased capacity to bear risk. To an outside observer, all the outward signs are that the decisions emanate from someone who has become less risk averse. The upshot is that demand responses to price changes are upward-sloping. When the price of the risky asset rises, the leveraged financial institution purchases more of the risky asset. The apparent increase in risk appetite induced by the price rise results in a desired holding of the asset that is larger than before the price increase. But then, the additional purchases of risky assets that result from such increased risk appetite fuels the asset price boom further, giving further impetus to the boom. The upward-sloping demand response has a mirror image in the downward phase of the financial cycle. When price falls, the risk appetite of the leveraged institution falls so much that, in spite of the fall in the price, the desired holding of the risky asset falls. The supply response is downward-sloping. As price falls, more of the asset is dumped on the market, depressing the price further.

The theme of upward-sloping demand response and the downward-sloping supply response goes hand in hand with the dual role of prices as both the reflection of fundamentals and the imperative for action.

The Presidential Commission appointed to investigate the circumstances of the crash (and chaired by the future Treasury Secretary Nicholas Brady) identified dynamic trading strategies by portfolio insurers as one of main contributing factors in the crash (Brady (1988)). Dynamic hedging attempts to position one's portfolio in reaction to price changes in order to mimic the payoffs from a put option. Since put options pay out when prices are low, this means maintaining a short position in the asset that becomes steeper as the price falls. In other words, dynamic hedging dictates that when the price falls, you sell more of the asset. This is a strategy that induces upward-sloping demand responses and downward-sloping supply responses - exactly the type of portfolio rebalancing responses that tends to amplify price changes. Just as with the leveraged financial institutions with apparently shifting risk appetite, the portfolio insurers who relied on dynamic hedging were an illustration of the principle that prices play a dual role - both as a reflection of actions (prices fell when they sold) as well as an imperative for actions (they sold when prices fell). Once locked into this loop, the feedback effect gained momentum.

Dynamic hedging relies on liquid markets - on there being others who will buy when I sell. But liquidity is a public good that comes from the diversity of trading positions. When a large segment of the market is engaged in such trading strategies, they become consumers of liquidity rather than providers of liquidity. But when price goes down, dynamic hedging dictates even larger sales. And as the market adage goes, one should never try to catch a falling knife, and so potential buyers stand on the sidelines until the knife drops to the ground.



Indeed, upward-sloping demands and downward-sloping supplies turn out to be much more pervasive when we look around the key players in financial markets. Many hedging strategies that attempt to rebalance assets and liabilities to shifts in market prices turn out, on closer inspection, to be variations of the dynamic hedging strategy described above. Market participants who pursue such strategies are consumers of liquidity rather than providers of liquidity. The demand and supply responses that such hedging strategies give rise to are often reinforced by regulations. Such regulations, although sensible in isolation, tends to promote instability in aggregate. The matching of asset and liability durations by pension funds is a good example.

The marking to market of pension fund liabilities is a practice adopted by pension regulators motivated by the desire to ensure the solvency of pension funds and to guide them toward better risk management practices in matching their assets to their future commitments. Accounting standards combined with solvency regulation have been important spurs to the adoption of asset-liability hedging strategies by pension funds who mark their liabilities to market and then hold an asset portfolio that shifts in line with the value of its liabilities. Such hedging techniques give rise to exactly the type of perverse demand and supply responses that tends to amplify the financial cycle. Once again, there is a divergence between what is prudent from the point of view of an individual actor and what promotes a resilient financial system.

Above all, the boom bust financial cycle owes itself to the way that the individual motives interact with the aggregate outcome in the financial system. One of the characteristic features of the financial system in the run-up to the global financial crisis of 2007 and 2008 has been the increased cross-exposures between financial institutions whereby balance sheets of financial institutions have become more intertwined.

The organising framework is the aggregate balance sheet of the banking and intermediary sector as a whole, where the assets are summed across individual institutions and the liabilities are summed across, also. Every liability that a bank has to another bank is an asset when viewed from the point of view of the lending bank. One asset cancels out another equal and opposite liability. In aggregate, all the claims and obligations across banks cancel out. Thus, in aggregate, the assets of the banking sector as a whole against other sectors of the economy consists of the lending to non-bank borrowers. This lending must be met by two sources - the total equity of the banking system, and the liabilities that banks have to lenders outside the banking system.

In a boom scenario where the marked-to-market equity of the banks are healthy and the measured risks are low, banks attempt to increase their balance sheets - sometimes quite substantially.

The fluctuations in financial intermediary balance sheets in aggregate tend to be much larger in scale compared to the available funding that is available from ultimate creditors (such as retail depositors) from outside the banking sector. Aggregate balance sheets can then grow only by the banks lending and borrowing more from each other. The desired risk-taking profiles and desired high leverage mean that banks take on more of each others' debts, and the intertwining of claims and liabilities become more far-reaching. As a consequence, the balance sheet trail from ultimate lender to ultimate borrower grows longer, and more tenuous.

The image is of an increasingly elaborate edifice built on the same narrow foundation, so that the structure becomes more and more precarious. The systemic risks therefore increase during the boom scenario.

The shortening of maturities is a natural companion to the lengthening of intermediation chains. In order for each link in the chain to be a profitable leveraged transaction, the funding leg of the transaction must be at a lower interest rate. When the yield curve is upward-sloping, this entails funding with shorter and shorter maturities at each step in the chain. The prevalence of the overnight repo as the dominant funding choice for securities firms before the current crisis can be understood in this context. The use of ultra-short term debt is part and parcel of long intermediation chains, as is the importance of short-term interest rates in determining the rate of growth of the financial sector balance sheets that fuel the boom.

Eventually, when the boom scenario gives way to the bust, all the processes that were involved in the boom then go into reverse in the bust. Leverage and risk spreads reverse leading to smaller balance sheets.

Just as expanding balance sheets entails greater intertwining of bank balance sheets, so the contraction of balance sheets entails the withdrawal of the funds that banks had granted to each other. This is a classic run scenario where banks run on other banks. The runs on Northern Rock, Bear Stearns and Lehman Brothers are all instances of such a run.

This brings us back full circle to the opening quote by the anonymous risk manager. Risk management is an essential part of the operation of a financial institution, and the value-added of a good risk management system can indeed be substantial. But there may be a divergence of interests between an individual firm and the system as a whole. Exploring exactly how the divergence of interests play out in the economy is an urgent modelling task for economists. As a first step, putting Value-at-Risk into a general equilibrium context is an important conceptual task that has barely begun. More needs to be done.

As well as the intellectual endeavours, there is also a need for a clear identification of the policy priorities. Academics, policy makers and market participants have pondered the lessons from the financial crisis, and are beginning to arrive at a consensus on the need for tougher regulatory oversight of financial institutions. However, as desirable as such regulatory changes are, they are almost certainly inadequate by themselves in meeting the challenge of the next boom-bust cycle. As the following lectures will hope to demonstrate, boom-bust cycles are driven by the fluctuations in the price of risk. Even if a new set of regulatory rules can be put in place that would have been effective at preventing yesterday's crisis, there is little guarantee that they will continue to be effective against new crises, riding on the back of as yet unimagined innovations designed to circumvent the rules.

Indeed, the greatest danger of the newly-found consensus on the need for tougher regulation arises not from the possible circumvention of the rules, but rather from the opportunities that the new consensus will present to central banks to repeat their mistakes in the conduct of monetary policy by giving them the all-clear to go back to business as usual, leaving the messy and unglamorous business of financial stability to others. As we will see in these lectures, financial stability has to do with fluctuations in the price of risk, and monetary policy must play its part in regulating the pricing of risk. Changes to financial regulation will be for nothing if the intellectual landscape at the institution at core of the financial system (the central bank) does not change.

6.2 ASSET BACKED RISK, CREDIT RISK, LIQUIDITY RISK, OPERATIONAL RISK

6.2.1 Asset-backed risk:

Risk that the changes in one or more assets that support an asset-backed security will significantly impact the value of the supported security. Risks include interest rate, term modification, and prepayment risk.

Prepayment Risk: Prepayment is the event that a borrower prepays the loan prior to the scheduled repayment date. Prepayment takes place when the borrowers can benefit from it, for example, when the borrowers can refinance the loan to a lower interest rate at another lender. Prepayments result in loss of future interest collections because the loan is paid back pre-maturely and can be harmful to the securities, especially for long term securities. A second, and maybe more important consequence of prepayments, is the impudence of un-scheduled prepayment of principal that will be distributed among the securities according to the priority of payments, reducing the outstanding principal amount, and thereby affecting their weighted average life. If an investor is concerned about a shortening of the term we speak about contraction risk and the opposite would be the extension risk, the risk that the weighted average life of the security is extended. In some circumstances, it will be borrowers with good credit quality that prepay and the pool credit quality will deteriorate as a result. Other circumstances will lead to the opposite situation.

Example:

Let's assume Company XYZ is in the business of making auto loans. When it makes a loan, it gives cash to the borrower and the borrower agrees to repay that amount with interest.



But if Company XYZ wants to make more loans, it may find itself needing cash to do so. This is where asset-backed securities come in.

Company XYZ can sell its auto loans to ABC Investments. As a result, Company XYZ receives cash to make more loans, and it transfers those auto loans from its balance sheet to ABC's balance sheet.

ABC Investments may group these auto loans into tranches--groups of loans that may have common characteristics such as maturity or delinquency risk. ABC then issues a security similar to a bond that essentially keeps an administrative fee for itself and then "forwards" the remaining proceeds from the auto loans to the investors.

The asset-backed securities trade on various exchanges, similar to any other security. Public ABS offerings must satisfy SEC requirements including providing regular financial disclosures to investors. Ratings agencies may assign a rating to the securities based largely on the probability that the underlying expected cash flows will materialize. In some cases, the ABS will receive higher credit ratings than the issuer has for itself; this is a reflection of the risk associated with the certainty of the ABS's underlying cash flows.

Why it Matters: *Asset-backed securities* have several important benefits. Primarily, they give lenders a way to obtain cash for more lending, and they offer investors a way to invest in a diversified group of income-producing assets.

The ABS market is not always as overvalued as the markets for other income-producing securities such as corporate bonds or Treasuries. For this reason, investors must carefully examine the features and underlying assets of a particular ABS before investing.

Note that the ABS are subject to prepayment risk; that is, if any of the borrowers pay their cars off early, this reduces the cash flows ultimately going to the ABS investors.

6.2.2 Credit risk:

Credit risk refers to the risk that a borrower will default on any type of debt by failing to make payments which it is obligated to do. The risk is primarily that of the lender and includes lost principal and interest, disruption to cash flows, and increased collection costs. The loss may be complete or partial and can arise in a number of circumstances. For example:

- ❖ A consumer may fail to make a payment due on a mortgage loan, credit card, line of credit, or other loan
- ❖ A company is unable to repay amounts secured by a fixed or floating charge over the assets of the company
- ❖ A business or consumer does not pay a trade invoice when due
- ❖ A business does not pay an employee's earned wages when due
- ❖ A business or government bond issuer does not make a payment on a coupon or principal payment when due
- ❖ An insolvent insurance company does not pay a policy obligation
- ❖ An insolvent bank won't return funds to a depositor
- ❖ A government grants bankruptcy protection to an insolvent consumer or business

To reduce the lender's credit risk, the lender may perform a credit check on the prospective borrower, may require the borrower to take out appropriate insurance, such as mortgage insurance or seek security or guarantees of third parties, besides other possible strategies. In general, the higher the risk, the higher will be the interest rate that the debtor will be asked to pay on the debt.

Types of credit risk

Credit risk can be classified in the following way:

- ❖ Credit default risk - The risk of loss arising from a debtor being unlikely to pay its loan obligations in full or the debtor is more than 90 days past due on any material credit obligation; default risk may impact all credit-sensitive transactions, including loans, Securities and derivatives.
- ❖ Concentration risk - The risk associated with any single exposure or group of exposures with the potential to produce large enough losses to threaten a bank's core operations. It may arise in the form of single name concentration or industry concentration.
- ❖ Country risk - The risk of loss arising from sovereign state freezing foreign currency payments (transfer/conversion risk) or when it defaults on its obligations (sovereign risk).

Assessing Credit Risk

Main articles: Credit analysis and Consumer credit risk

Significant resources and sophisticated programs are used to analyze and manage risk. Some companies run a credit risk department whose job is to assess the financial health of their customers, and extend credit (or not) accordingly. They may use in house programs to advise on avoiding, reducing and transferring risk. They also use third party provided intelligence. Companies like Standard & Poor's, Moody's, Fitch Ratings, and Dun and Bradstreet provide such information for a fee. Most lenders employ their own models (credit scorecards) to rank potential and existing customers according to risk, and then apply appropriate strategies. With products such as unsecured personal loans or mortgages, lenders charge a higher price for higher risk customers and vice versa. With revolving products such as credit cards and overdrafts, risk is controlled through the setting of credit limits. Some products also require security, most commonly in the form of property.

Credit scoring models also form part of the framework used by banks or lending institutions grant credit to clients. For corporate and commercial borrowers, these models generally have qualitative and quantitative sections outlining various aspects of the risk including, but not limited to, operating experience, management expertise, asset quality, and leverage and liquidity ratios, respectively. Once this information has been fully reviewed by credit officers and credit committees, the lender provides the funds subject to the terms and conditions presented within the contract (as outlined above).

6.2.3 Liquidity risk

In finance, **liquidity risk** is the risk that a given security or asset cannot be traded quickly enough in the market to prevent a loss (or make the required profit).

Causes of liquidity risk

Liquidity risk arises from situations in which a party interested in trading an asset cannot do it because nobody in the market wants to trade for that asset. Liquidity risk becomes particularly important to parties who are about to hold or currently hold an asset, since it affects their ability to trade.

Manifestation of liquidity risk is very different from a drop of price to zero. In case of a drop of an asset's price to zero, the market is saying that the asset is worthless. However, if one party cannot find another party interested in trading the asset, this can potentially be only a problem of the market participants with finding each other. This is why liquidity risk is usually found to be higher in emerging markets or low-volume markets.

Liquidity risk is financial risk due to uncertain liquidity. An institution might lose liquidity if its credit rating falls, it experiences sudden unexpected cash outflows, or some other event causes counterparties to avoid trading with or lending to the institution. A firm is also exposed to liquidity risk if markets on which it depends are subject to loss of liquidity.

Market and funding liquidity risks compound each other as it is difficult to sell when other investors



face funding problems and it is difficult to get funding when the collateral is hard to sell. Liquidity risk also tends to compound other risks. If a trading organization has a position in an illiquid asset, its limited ability to liquidate that position at short notice will compound its market risk. Suppose a firm has offsetting cash flows with two different counterparties on a given day. If the counterparty that owes it a payment defaults, the firm will have to raise cash from other sources to make its payment. Should it be unable to do so, it too will default. Here, liquidity risk is compounding credit risk.

A position can be hedged against market risk but still entail liquidity risk. This is true in the above credit risk example—the two payments are offsetting, so they entail credit risk but not market risk. Another example is the 1993 *Metallgesellschaft* debacle. Futures contracts were used to hedge an Over-the-counter finance OTC obligation. It is debatable whether the hedge was effective from a market risk standpoint, but it was the liquidity crisis caused by staggering margin calls on the futures that forced *Metallgesellschaft* to unwind the positions.

Accordingly, liquidity risk has to be managed in addition to market, credit and other risks. Because of its tendency to compound other risks, it is difficult or impossible to isolate liquidity risk. In all but the most simple of circumstances, comprehensive metrics of liquidity risk do not exist. Certain techniques of asset-liability management can be applied to assessing liquidity risk. A simple test for liquidity risk is to look at future net cash flows on a day-by-day basis. Any day that has a sizeable negative net cash flow is of concern. Such an analysis can be supplemented with stress testing. Look at net cash flows on a day-to-day basis assuming that an important counterparty defaults.

Analyses such as these cannot easily take into account contingent cash flows, such as cash flows from derivatives or mortgage-backed securities. If an organization's cash flows are largely contingent, liquidity risk may be assessed using some form of scenario analysis. A general approach using scenario analysis might entail the following high-level steps:

- ❖ Construct multiple scenarios for market movements and defaults over a given period of time
- ❖ Assess day-to-day cash flows under each scenario.

Because balance sheets differ so significantly from one organization to the next, there is little standardization in how such analyses are implemented.

Regulators are primarily concerned about systemic and implications of liquidity risk.

Types of Liquidity Risk

Market liquidity - An asset cannot be sold due to lack of liquidity in the market – essentially a sub-set of market risk. This can be accounted for by:

- ❖ Widening bid/offer spread
- ❖ Making explicit liquidity reserves
- ❖ Lengthening holding period for VaR calculations

Funding liquidity - Risk that liabilities:

- ❖ Cannot be met when they fall due
- ❖ Can only be met at an uneconomic price
- ❖ Can be name-specific or systemic

Example:

Liquidity risk generally arises when a business or individual with immediate cash needs, holds a valuable asset that it cannot trade or sell at market value due to a lack of buyers, or due to an inefficient where it is difficult to bring buyers and sellers together.

For example, consider a \$1,000,000 home with no buyers. The home obviously has value, but due to market conditions at the time, there may be no interested buyers. In better economic times when

market conditions improve and demand increases, the house may sell for well above that price. However, due to the home owner's need of cash to meet near term financial demands, the owner may be unable to wait and have no other choice but to sell the house in an illiquid market at a significant loss. Hence, the liquidity risk of holding this asset.

6.2.4 Operational risk:

An operational risk is defined as a risk incurred by an organization's internal activities. Operational risk is the broad discipline focusing on the risks arising from the people, systems and processes through which a company operates. It can also include other classes of risk, such as fraud, legal risks, physical or environmental risks.

A widely used definition of operational risk is the one contained in the Basel II [1] regulations. This definition states that operational risk is the risk of loss resulting from inadequate or failed internal processes, people and systems, or from external events.

Operational risk management differs from other types of risk, because it is not used to generate profit (e.g. credit risk is exploited by lending institutions to create profit, market risk is exploited by traders and fund managers, and insurance risk is exploited by insurers). They all however manage operational risk to keep losses within their risk appetite - the amount of risk they are prepared to accept in pursuit of their objectives. What this means in practical terms is that organisations accept that their people, processes and systems are imperfect, and that losses will arise from errors and ineffective operations. The size of the loss they are prepared to accept, because the cost of correcting the errors or improving the systems is disproportionate to the benefit they will receive, determines their appetite for operational risk.

The Basel II Committee defines operational risk as:

"The risk of loss resulting from inadequate or failed internal processes, people and systems or from external events."

However, the Basel Committee recognizes that operational risk is a term that has a variety of meanings and therefore, for internal purposes, banks are permitted to adopt their own definitions of operational risk, provided that the minimum elements in the Committee's definition are included.

Meaning of 'Operational Risk': A form of risk that summarizes the risks a company or firm undertakes when it attempts to operate within a given field or industry. Operational risk is the risk that is not inherent in financial, systematic or market-wide risk. It is the risk remaining after determining financing and systematic risk, and includes risks resulting from breakdowns in internal procedures, people and systems.

Example of operational risk losses include: internal frauds (insider trading, misappropriation of assets) or external frauds like theft, natural disasters like terrorism or system related failures like M&A related disruption and other technological breakdowns. However, operational risk is harder to quantify to quantify and model than market and credit risks.

6.3 FOREIGN INVESTMENT RISK & MARKET RISK

6.3.1 Foreign Investment Risk

Assessing foreign investment risk also means looking closely at what is happening in the country of origin. The general economy of that country will have some impact on the future business operations of the issuer. If there is evidence that the economy is about to enter some sort of downturn, care must be taken to determine how much impact that change would have on the value of the investment opportunity. The investor can determine if the shift in the economy will last long enough to have a detrimental effect on the investment, and if there is a good chance the investment would rebound and earn a significant profit once the economy recovers.

Along with the present and future state of the economy, evaluating foreign investment risk also



involves considering the degree of political risk associated with the holding. Political shifts could undermine confidence in the issuer in some cases. At other times, a new political regime could also mean changes in foreign exchange rates that negatively impact the value of the asset, or even shifts in foreign withholding taxes in the country of origin or the home country of the investor. Understanding what could happen, and how that could impact the returns generated by the acquired asset, will make it much easier to determine if the foreign investment risk is worth it, or if going with a different investment opportunity would be a better decision.

Example:

- ❖ Changes in currency exchange rates. When the exchange rate between the foreign currency of an international investment and the U.S. dollar changes, it can increase or reduce your investment return. How does this work? Foreign companies trade and pay dividends in the currency of their local market. When you receive dividends or sell your international investment, you will need to convert the cash you receive into U.S. dollars. During a period when the foreign currency is strong compared to the U.S. dollar, this strength increases your investment return because your foreign earnings translate into more dollars. If the foreign currency weakens compared to the U.S. dollar, this weakness reduces your investment return because your earnings translate into fewer dollars. In addition to exchange rates, you should be aware that some countries may impose foreign currency controls that restrict or delay you from moving currency out of a country.
- ❖ Dramatic changes in market value. Foreign markets, like all markets, can experience dramatic changes in market value. *One way to reduce the impact of these price changes is to invest for the long term and try to ride out sharp upswings and downturns in the market.* Individual investors frequently lose money when they try to “time” the market in the United States and are even less likely to succeed in a foreign market. When you “time” the market you have to make two astute decisions - deciding when to get out before prices fall and when to get back in before prices rise again.
- ❖ Political, economic and social events. It is difficult for investors to understand all the political, economic, and social factors that influence foreign markets. These factors provide diversification, but they also contribute to the risk of international investing.
- ❖ Lack of liquidity. Foreign markets may have lower trading volumes and fewer listed companies. They may only be open a few hours a day. Some countries restrict the amount or type of stocks that foreign investors may purchase. You may have to pay premium prices to buy a foreign security and have difficulty finding a buyer when you want to sell.
- ❖ Less information. Many foreign companies do not provide investors with the same type of information as U.S. public companies. It may be difficult to locate up-to-date information, and the information the company publishes may not be in English.
- ❖ Reliance on foreign legal remedies. If you have a problem with your investment, you may not be able to sue the company in the United States. Even if you sue successfully in a U.S. court, you may not be able to collect on a U.S. judgment against a foreign company. You may have to rely on whatever legal remedies are available in the company’s home country.
- ❖ Different market operations. Foreign markets often operate differently from the major U.S. trading markets. For example, there may be different periods for clearance and settlement of securities transactions. Some foreign markets may not report stock trades as quickly as U.S. markets. Rules providing for the safekeeping of shares held by custodian banks or depositories may not be as well developed in some foreign markets, with the risk that your shares may not be protected if the custodian has credit problems or fails.

6.3.2 Market Risk

The possibility for an investor to experience losses due to factors that affect the overall performance of the financial markets. Market risk, also called “systematic risk,” cannot be eliminated through

diversification, though it can be hedged against. The risk that a major natural disaster will cause a decline in the market as a whole is an example of market risk. Example of market risk recessions, political turmoil, changes in interest rates and terrorist attacks, credit policy.

Market risk is the risk of losses in positions arising from movements in market prices. Some market risks include:

- ❖ *Equity risk*, the risk that stock or stock indexes (e.g. Euro Stoxx 50, etc.) prices and/or their implied volatility will change.
- ❖ *Interest rate risk*, the risk those interest rates (e.g. Libor, Euribor, etc.) and/or their implied volatility will change.
- ❖ *Currency risk*, the risk that foreign exchange rates (e.g. EUR/USD, EUR/GBP, etc.) and/or their implied volatility will change.
- ❖ *Commodity risk*, the risk that commodity prices (e.g. corn, copper, crude oil, etc.) and/or their implied volatility will change.

Measuring the potential loss amount due to market risk:

- ❖ As with other forms of risk, the potential loss amount due to market risk may be measured in a number of ways or conventions. Traditionally, one convention is to use Value at Risk. The conventions of using Value at risk are well established and accepted in the short-term risk management practice.
- ❖ However, it contains a number of limiting assumptions that constrain its accuracy. The first assumption is that the composition of the portfolio measured remains unchanged over the specified period. Over short time horizons, this limiting assumption is often regarded as reasonable. However, over longer time horizons, many of the positions in the portfolio may have been changed. The Value at Risk of the unchanged portfolio is no longer relevant.
- ❖ The Variance Covariance and Historical Simulation approach to calculating Value at Risk also assumes that historical correlations are stable and will not change in the future or breakdown under times of market stress.
- ❖ In addition, care has to be taken regarding the intervening cash flow, embedded options, changes in floating rate interest rates of the financial positions in the portfolio. They cannot be ignored if their impact can be large.

6.4 FINANCIAL RISK IDENTIFICATION BASED ON THE BALANCE SHEET INFORMATION

The exposure to risk in modern economy is constantly growing. All enterprises have to take up different types of risks. The potential of identifying financial risk based on the balance sheet information is of immense importance.

Modern society is often described as "the society of risk", which means that the social production of wealth is accompanied by the social production of risk. Therefore, enterprises operating in such environment, are forced to take up different types of risk, in order to develop themselves and increase their effectiveness. Thus their exposure to risk is constantly growing.

There is a huge variety of corporate risks that are analyzed and classified taking into account different types of criteria. One of the most important types of corporate risk is financial risk.

6.4.1 Defining financial risk and its components

There is no unified definition of financial risk in the literature. But the problem begins with the general definition of risk.

In the theory there are presented two conceptions of risk definition. The first one - the negative conception describes risk as a threat of potential loss. The second one – the neutral conception



suggests that risk is not only a threat but also an opportunity, so the risk means the possibility of obtaining results different than expected.

Thus the definition of risk depends mainly on the approach towards risk and it may result in different actions taken up by the managers. In case of the negative approach, the main aim of the managers will be to minimize the potential loss and try to avoid risky actions, in order to stabilize the situation of the company. In the second situation, the managers will not only try to minimize the loss, but also try to take advantage of the undertaken risk and improve the situation of the company. Thus financial risk, as any type of risk, can be analyzed from neutral or negative perspective.

In the theory of finance, one can also find different meaning of financial risk.

In narrow meaning the financial risk is described as the additional risk borne by the shareholders due to the substitution of debt for common stock. Thus, in this meaning, financial risk is an equivalent to the capital structure risk.

In broad meaning, the financial risk is defined as any fluctuation in the cash flows, financial results and the company's value due to the influence of different types of factors; mainly market ones, such as: interest rates, exchange rates, and commodity and stock prices. So, according to this definition financial risk is responsible for any changes in the financial condition of the company.

In this paper the narrow definition of the financial risk is applied, with one modification -two additional components are included in the financial risk besides the capital structure risk – liquidity risk and insolvency risk (or long-term stability risk) which are connected with the financing decisions of the company. Therefore financial risk analyzed in this paper would be equal to the financing risk including three components:

1. capital structure risk arising by using debt capital to finance part of the company's assets;
2. liquidity risk connected with the ability of the company to pay its short term liabilities by using assets that can be quickly converted into cash (current assets);
3. long-term stability risk connected with the sources of finance used to buy long-term assets (fixed assets) and long-term insolvency risk.

It is worth mentioning that financial risk in presented meaning is only one part of the overall corporate risk. There are many others types of risk which should be taken into account while preparing an integrated approach to risk management process in the company.

Despite different approaches to risk definition, modern companies must be aware of their exposure to risk and should take up actions in a form of planned risk management process aiming at acceptable level of risk. This process includes three stages: analysis, manipulation and monitoring of risk.

Risk management process starts with risk analysis, which enables the company to identify different types of risk, to recognize risk factors and to evaluate the potential consequences of risk by measuring risk exposure. Next stage - risk manipulation - includes different scenarios of actions that are prepared for each type of risk. The company can use variety of risk management tools, both traditional (e.g. insurance) and modern ones (e.g. derivatives), that should be tailored to company's unique situation and needs. Taken actions should be continuously monitored and controlled to check up their results, compare them to the plan and introduce modification if it is required. Risk monitoring enables the company to forecast the level of risk and prepare the company's actions in future. Thus, the risk assessment is a continuous process that is an important part of the risk management, and is realized at the first and the third stage – risk analysis and monitoring of risk.

There are many risk assessment methods – one of them is financial analysis, that can be used both at the stage of risk analysis and risk monitoring. Financial analysis is a financial management tool that uses different sources of information concerning company's past and current activities as well as its present and future financial situation. The most important sources of information used in the financial analysis are financial statements provided by the accounting system, translating a company's diverse

activities into a set of objective numbers that inform about the company's performance, problems and prospects. Financial data included in the financial statements can be used to identify the types of risk and their factors, to recognize the reasons and consequences of the corporate risk, to analyze the results of risk management tools and to forecast the level of risk in future.

It is worth mentioning that analysis of the financial risk can be prepared for internal purposes of the company and also for the external parties – that is any stakeholders that are interested in assessing the financial situation of the company (current and future) – these are mainly shareholders and potential investors, including creditors thinking about providing capital to the company. Risk analysis for this group of the statement users is a little bit different than for company's internal purposes – as they are interested in the overall company's risk to estimate risk premium included in the expected rate of return on investment made in the company.

6.4.2 Using Balance Sheet Information to Assess the Financial Risk

The first element of the financial statement is the balance sheet presenting the company's financial position at a single point of time, including company's assets and the liability and equity claims against those assets. Basic elements of the balance sheet are presented in table 1.

	Assets	Capital
	<u>Fixed assets:</u>	<u>Equity capital:</u>
1.	Intangible assets	1. Common stock
2.	Net plant and equipment	2. Additional paid-in capital
3.	Long-term accounts receivable	3. Retained profit
4.	Long-term investment	
	<u>Current assets:</u>	<u>Debt capital:</u>
1.	Inventory	1. Long-term debt capital
2.	Accounts receivable	2. Current liabilities
3.	Short-term investment	

Table 1: General Model of a Balance Sheet

By using balance sheet information the three components of the financial risk can be identified and analyzed: capital structure risk, liquidity risk and insolvency risk (figure 1).

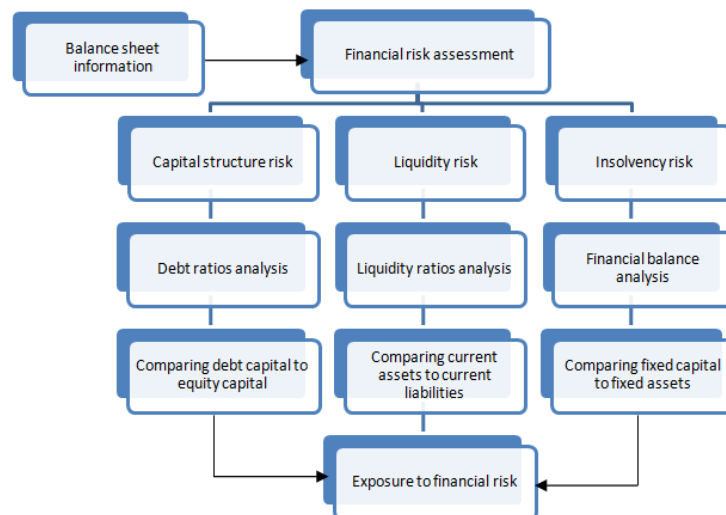


Figure 1: Financial Risk- its Components and Identification based on the Balance Sheet Information



To analyze the capital structure risk one should calculate the D/E ratio (debt-to-equity ratio) comparing debt to equity capital used by the company to finance its assets. D/E ratio is one of the most important indebtedness ratios showing the financial leverage used by the company. The higher this ratio is, the higher financial risk connected with using debt capital by the company. The optimal value for this ratio is described as 1 till 3 – in this situation the company can use all the advantages of the debt capital (mainly tax shield) without too high risk of financial distress. Obviously, presented standard results from theoretical studies, in real world each company should look for its optimal value taking into account its characteristics and unique situation – this problem is connected with searching for the optimal capital structure.

When more detailed information on capital structure is needed there can be calculated additional ratios, such as:

- ❖ debt to assets ratio (D/A) showing the part of the company's assets financed by debt capital;
 - ❖ equity to assets ratio showing part of the assets that belongs to the shareholders;
 - ❖ retained profit to assets ratio showing part of the assets financed by the internal equity capital generated by the company itself, thus showing its independence from external sources of finance;
 - ❖ long-term debt capital to assets – showing part of the assets financed by long-term debt capital;
 - ❖ long-term debt capital to equity – showing the level of financial leverage taking into account only long-term debt;
 - ❖ interest-bearing liabilities to equity – showing the level of financial leverage taking into account only debt capital which usage is connected with interest payments;
 - ❖ long-term debt capital to total debt showing the structure of the company's liabilities.
- More detailed ratios describing company's capital structure can be constructed when needed.

The second element of the financial risk analysis is connected with liquidity. The basic analysis of the company's liquidity risk can be conducted by the usage of liquidity ratios based on the balance sheet information. There are three basic liquidity ratios: current, quick and cash ratio.

Current ratio equals to current assets divided by current liabilities and indicates the amount of current assets available to meet all of the maturing obligations listed under current liabilities. The optimal value for this ratio is between 1,5-2,0 - this means that below 1,5 the company may have problems with paying its current obligations on time, and in the opposite situation, when it is higher than 2,0 - this may lead to lower efficiency due to excess cash balances, slow paying receivables or obsolete inventory (over liquidity).

Second liquidity ratio is more conservative as it takes into account current assets excluding inventory as the least liquid part of them. The general standard for quick ratio is 1 to 1 between current assets without inventory and current liabilities.

Similar information is provided by the cash ratio, in which cash is divided by current liabilities. As these ratios are calculated by the usage of balance sheet information, their results are static, and the data are valid only for the balance sheet day. To analyze the dynamic changes in the liquidity risk, the managers can use the cash flow statement and the cash sufficiency ratios (cash coverage ratios).

In addition to liquidity ratios, in order to assess the liquidity risk of the company, the level of net working capital can be calculated and analyzed. Net working capital is defined as part of the company's current assets financed by the fixed capital⁷ and it can be calculated as the difference between current assets and current liabilities. Net working capital can be compared to total assets indicating the percentage of assets that a company carries as net working capital. The main role of the net working capital in the company is the additional liquidity reserve and it is considered as one of the most important aspects of the company's strength. The higher level of net working capital, the lower liquidity risk due to a stronger liquidity condition, however the problem of the company's efficiency should be

taken into consideration as well, as higher level of net working capital is connected with higher cost of capital. So after some point, further increase in net working capital becomes ineffective [see more about liquidity analysis.

The third element of the financial risk assessment is connected with long-term stability and financial balance of the company. It is recognized that the company keeps financial balance, if its long-term assets are financed by long-term sources of finance, and short-term assets by short-term sources of funds. Otherwise, company loses its financial balance, which may lead to financial instability and problems with long-term solvency of the company that may result in bankruptcy.

To analyze the financial balance of the company, two golden rules can be used. According to the first rule (I), fixed assets should be covered by equity capital; only in this situation the financial balance is maintained. Second rule (II) is less restrictive, as according to it, fixed assets may be financed by fixed capital including equity capital together with long-term debt capital. If at least, the second golden rule (II) is maintained, the company keeps financial balance and its insolvency risk is very low. Otherwise the risk of potential bankruptcy is significant.

Study Note - 7

FINANCIAL DERIVATIVES AS A TOOLS FOR RISK MANAGEMENT



This Study Note includes

7.1 Forward & Futures

7.2 Options

7.3 Swaps & Swaption

7.4 Interest Rate Derivatives

Derivatives can be seen as bets based on the behaviour of the underlying basic assets. A derivative can also be regarded as a kind of asset, the ownership of which entitles the holder to receive from the seller a cash payment or possibly a series of cash payments at some point in the future, depending in some pre-specified way on the behaviour of the underlying assets over the relevant time interval. In some instances, instead of a 'cash' payment another asset might be delivered instead. For example, a basic stock option allows the holder to purchase shares at some point in the future for a pre-specified price. In general an option is a derivative with a specified payoff function that can depend on the prices of one or more underlying assets. It will have specific dates when it can be exercised, that is, when the owner of the option can demand payment, based on the value of the payoff function.

Derivatives are used for a variety of purposes. They can be used to reduce risk by allowing the investor to hedge an investment or exposure, and hence function as a sort of insurance policy against adverse market movements. For example, if a firm needs a particular commodity, such as petroleum, on a regular basis, then they can guard against a rise in the price of oil by purchasing a call option. If the price of oil remains low, then the option is not exercised and the oil is bought at the current price in the market, while if the price rises above the strike, then the option is exercised to buy oil at a below-market value.

Derivatives can also be used to gain extra leverage for specialized market speculation. In other words, if an investor has reason to believe that the market is going to move in a particular way, then a larger profit per dollar invested can be made by buying suitable derivatives, rather than the underlying asset. But similarly, if the investment decision is wrong, the investor runs the risk of making a correspondingly larger loss.

In London, organised derivatives trading takes place at the London International Financial Futures and Options Exchange (LIFFE).

A derivative contract is defined by

- its payoff function $f(t, S(t))$
- its purchase price f_0 .

The most common types of derivatives are forwards, futures, swaps and options.

Financial derivatives are instruments whose value depends, or derives from, one or more underlying financial assets. The underlying assets include financial securities, security indexes, reference rates, and some combination of them.

- ❖ A financial forward obligates its owner to buy a specified financial asset on a specified future date at the origination of the contract.
- ❖ Financial futures are a special kind of financial forward contract traded on organized exchanges and thus can be defined similarly.

- ❖ A financial option gives its owner the right rather than the obligation to buy or to sell specified financial assets at a predetermined price on (and sometimes before) a stated expiration date.
- ❖ A financial swap is an agreement between counterparties to make periodic payments, based on a specified financial asset, to each other for a specified period.

These basic instruments can be combined to create numerous more complex derivatives. Also, financial derivatives exist in two forms: exchange-listed and OTC (over-the-counter). Exchange-listed derivative products are composed of financial futures and options while OTC derivative products include financial swaps and forwards, as well as some financial options.

One of the most important functions of financial derivatives is risk management; it is already widely recognized by most market participants. Recent publicity of losses in derivative transactions casts some doubt on the soundness of using derivatives. However, many have realized that properly managed derivatives are a key to keeping many economic/financial system competitive, and losses mostly result from speculation and other factors not directly related to derivatives. Better understanding of financial derivatives' uses is necessary and important to keep derivative markets growing and healthy.

Benefits of Using Financial Derivatives

The general benefits of using financial derivatives as follows:

1. A prudent use of financial derivatives can provide a new mechanism to manage or reduce various business risks at low transaction cost.
2. The innovative use of financial derivatives can greatly help end-users cut their financing cost.
3. Financial derivatives can provide more access to financial markets, especially to unfamiliar ones at lower costs. Put another way, they can create more complete markets to investors.
4. Financial derivative instruments play an important role in asset management due to their lower transaction costs relative to the spot market instruments.
5. The users of financial derivatives can expect to be offered opportunities on taking advantage of asymmetries in tax and regulatory requirements across different countries, markets or securities.
6. Financial derivatives can be used to speculate and make profits by assuming certain risks, probably with suitable degree.

Outcomes of using Derivatives

Despite the recent adverse press they have received, derivative securities provide a number of useful functions in the areas of risk management and investments. In fact, derivatives were originally designed to enable market participants to eliminate risk. A wheat farmer, for example, can fix a price for his crop even before it is planted, eliminating price risk. An exporter can fix a foreign exchange rate even before beginning to manufacture the product, eliminating foreign exchange risk. If misused, however, derivative securities are also capable of dramatically increasing risk.

7.1 FORWARD & FUTURES

Valuing Futures and Forward Contracts

A futures contract is a contract between two parties to exchange assets or services at a specified time in the future at a price agreed upon at the time of the contract. In most conventionally traded futures contracts, one party agrees to deliver a commodity or security at some time in the future, in return for an agreement from the other party to pay an agreed upon price on delivery. The former is the seller of the futures contract, while the latter is the buyer.

This chapter explores the pricing of futures contracts on a number of different assets - perishable commodities, storable commodities and financial assets - by setting up the basic arbitrage relationship between the futures contract and the underlying asset. It also examines the effects of transactions costs



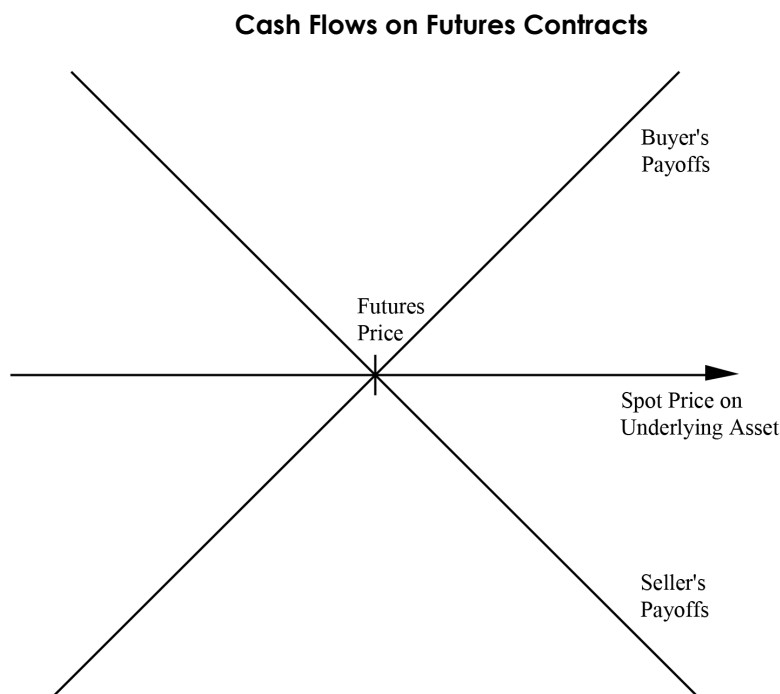
and trading restrictions on this relationship and on futures prices. Finally, the chapter reviews some of the evidence on the pricing of futures contracts.

Futures, Forward and Option Contracts

Futures, forward and option contracts are all viewed as derivative contracts because they derive their value from an underlying asset. There are however some key differences in the workings of these contracts.

How a Futures Contract works

There are two parties to every futures contract - the seller of the contract, who agrees to deliver the asset at the specified time in the future, and the buyer of the contract, who agrees to pay a fixed price and take delivery of the asset.



While a futures contract may be used by a buyer or seller to hedge other positions in the same asset, price changes in the asset after the futures contract agreement is made provide gains to one party at the expense of the other. If the price of the underlying asset increases after the agreement is made, the buyer gains at the expense of the seller. If the price of the asset drops, the seller gains at the expense of the buyer.

Futures versus Forward Contracts

While futures and forward contracts are similar in terms of their final results, a forward contract does not require that the parties to the contract settle up until the expiration of the contract. Settling up usually involves the loser (i.e., the party that guessed wrong on the direction of the price) paying the winner the difference between the contract price and the actual price. In a futures contract, the differences is settled every period, with the winner's account being credited with the difference, while the loser's account is reduced. This process is called marking to the market. While the net settlement is the same under the two approaches, the timing of the settlements is different and can lead to different prices for the two types of contracts. The difference is illustrated in the following example, using a futures contract in gold.

Example: Futures versus Forward Contracts - Gold Futures Contract

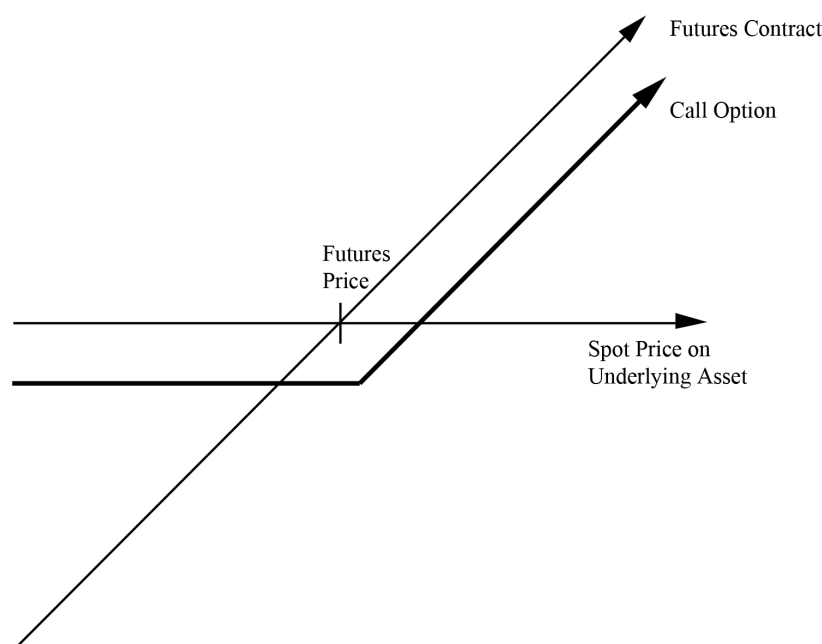
Assume that the spot price of gold is \$400, and that a three-period futures contract on gold has a price of \$415. The following table summarizes the cash flow to the buyer and seller of this contract on a futures and forward contract over the next 3 time periods, as the price of the gold futures contract changes.

Time Period	Gold Futures Contract	Buyer's CF: Forward	Seller's CF: Forward	Buyer's CF: Futures	Seller's CF: Futures
1	\$420	\$0	\$0	\$5	-\$5
2	\$430	\$0	\$0	\$10	-\$10
3	\$425	\$10	-\$10	-\$5	\$5
Net		\$10	-\$10	\$10	-\$10

The net cash flow from the seller to the buyer is \$10 in both cases, but the timing of the cash flows is different. On the forward contract, the settlement occurs at maturity. On the futures contract, the profits or losses are recorded each period.

Futures and Forward Contracts versus Option Contracts

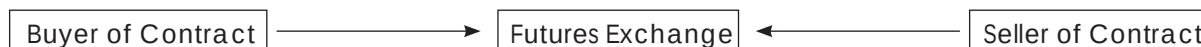
While the difference between a futures and a forward contract may be subtle, the difference between these contracts and option contracts is much greater. In an options contract, the buyer is not obligated to fulfill his side of the bargain, which is to buy the asset at the agreed upon strike price in the case of a call option and to sell the asset at the strike price in the case of a put option. Consequently the buyer of an option will exercise the option only if it is in his or her best interests to do so, i.e., if the asset price exceeds the strike price in a call option and vice versa in a put option. The buyer of the option, of course, pays for this privilege up front. In a futures contract, both the buyer and the seller are obligated to fulfill their sides of the agreement. Consequently, the buyer does not gain an advantage over the seller and should not have to pay an up front price for the futures contract itself. Figure summarizes the differences in payoffs on the two types of contracts in a payoff diagram.

Buying a Futures Contract versus Buying a Call Option



Traded Futures Contracts - Institutional Details

A futures contract is an agreement between two parties. In a traded futures contract, an exchange acts as an intermediary and guarantor, and also standardizes and regulates how the contract is created and traded.



In this section, we will examine some of the institutional features of traded futures contracts.

1. Standardization

Traded futures contracts are standardized to ensure that contracts can be easily traded and priced. The standardization occurs at a number of levels.

- (a) **Asset Quality and Description:** The type of asset that can be covered by the contract is clearly defined. For instance, a lumber futures contract traded on the Chicago Mercantile Exchange allows for the delivery of 110,000 board feet of lumber per contract. A treasury bond futures contract traded on the Chicago Board of Trade requires the delivery of bonds with a face value of \$100,000 with a maturity of greater than 15 years .
- (b) **Asset Quantity:** Each traded futures contract on an asset provides for the delivery of a specified quantity of the asset. For instance, a gold futures contract traded on the Chicago Board of trade requires the delivery of 100 ounces of gold at the contracts expiration. The purpose of the standardization is to ensure that the futures contracts on an asset are perfect substitutes for each other. This allows for liquidity and also allows parties to a futures contract to get out of positions easily.

2. Price Limits

Futures exchanges generally impose 'price movement limits' on most futures contracts. For instance, the daily price movement limit on orange juice futures contract on the New York Board of Trade is 5 cents per pound or \$750 per contract (which covers 15,000 pounds). If the price of the contract drops or increases by the amount of the price limit, trading is generally suspended for the day, though the exchange reserves the discretion to reopen trading in the contract later in the day. The rationale for introducing price limits is to prevent panic buying and selling on an asset, based upon faulty information or rumors, and to prevent overreaction to real information. By allowing investors more time to react to extreme information, it is argued, the price reaction will be more rational and reasoned.

3. Marking to Market

One of the unique features of futures contracts is that the positions of both buyers and sellers of the contracts are adjusted every day for the change in the market price that day. In other words, the profits or losses associated with price movements are credited or debited from an investor's account even if he or she does not trade. This process is called marking to market.

4. Margin Requirements for Trading

In a futures agreement, there is no payment made by the buyer to the seller, nor does the seller have to show proof of physical ownership of the asset at the time of the agreement. In order to ensure, however, that the parties to the futures contract fulfill their sides of the agreement, they are required to deposit funds in a margin account. The amount that has to be deposited at the time of the contract is called the initial margin. As prices move subsequently, the contracts are marked to market, and the profits or losses are posted to the investor's account. The investor is allowed to withdraw any funds in the margin account in excess of the initial margin. Table 1 summarizes price limits and contract specifications for many traded futures contracts as of June 2001.

Table 1: Futures Contracts: Description, Price Limits and Margins

Contract	Exchange	Specifications	Tick Value	Initial Margin/Contract	Daily Limit/unit
Softs					
Coffee	NYBOT	37,500 lbs	\$18.75/0.050 ¢	\$2,450	none
Sugar	NYBOT	112,000 lbs	\$11.20/0.010 ¢	\$840	none
Cocoa	NYBOT	10 metric tons	\$10/10 ¢	\$980	none
Cotton	NYBOT	50,000 lbs	\$5/0.010 ¢	\$1,000	30
Orange Juice	NYBOT	15,000 lbs	\$7.50/0.050 ¢	\$700	50
Metals					
Gold	NYMEX	100 troy ozs	\$10/100 ¢	\$1,350	\$75
Kilo Gold	CBOT	1 gross kgm	\$3.22/100 ¢	\$473	\$50
Silver	NYMEX	5000 troy ozs	\$25/0.50 ¢	\$1,350	\$1.50
5000oz Silver	CBOT	5000 troy ozs	\$5/0.10 ¢	\$270	\$1
Copper	NYMEX	25,000 lbs	\$12.50/0.050 ¢	\$4,050	\$0.20
Platinum	NYMEX	50 troy ozs	\$5/100 ¢	\$2,160	\$25
Palladium	NYMEX	100 troy ozs	\$5/50 ¢	\$67,500	none
Energy					
Crude	NYMEX	1,000 barrels	\$10/10 ¢	\$3,375	\$7.50 first
Unleaded	NYMEX	42,000 gallons	\$4.20/0.010 ¢	\$3,375	20¢ first
Heating Oil	NYMEX	42,000 gallons	\$4.20/0.010 ¢	\$3,375	20¢ first
Natural Gas	NYMEX	10,000 mm Btu	\$10/0.010 ¢	\$4,725	\$1
Agriculture					
Live Cattle	CME	40,000 lbs	\$10/2.50	\$810	1.50
Feeder Cattle	CME	50,000 lbs	\$12.50/2.50	\$945	1.50
Lean Hogs	CME	40,000 lbs	\$10/2.50	\$999	20
Pork Bellies	CME	40,000 lbs	\$10/2.50	\$1,620	30
Lumber	CME	110,000 ft	\$11/100	\$1,013	\$10
Currencies					
EuroCurrency	CME	125,000 Euros	\$12.50/0.010	\$2,349	400 ticks
Swiss Franc	CME	125,000 Sfr	\$12.50/0.010	\$1,755	400 ticks
Japanese Yen	CME	12,500,000 Yen	\$12.50/0.00010	\$2,835	400 ticks
British Pound	CME	62,500 Bp	\$6.25/0.020	\$1,418	800 ticks
Canadian Dlr	CME	100,000 C\$	\$10/0.010	\$608	400 ticks
Australian Dlr	CME	100,000 A\$	\$10/0.010	\$1,215	400 ticks
MexicanPeso	CME	500,000 pesos	\$12.50/0.00250	\$2,500	2000 ticks
Dollar Index	NYBOT	\$1,000 times dollar index	\$10/0.010	\$1,995	2 pts
Interest Rate					
T-Bond	CBOT	\$100,000 face value	\$31.25/1/32	\$2,363	None
T-Note (10)	CBOT	\$100,000 face value	\$31.25/1/32	\$1,620	None
T-Note (5)	CBOT	\$100,000 face value	\$31.25/1/32	\$1,080	None



Muni Bond	CBOT	\$1,000 times the closing value of The Bond			
Buyer™ 40 Index	\$31.25/1/32	\$1,350	None		
Midam Bond	MIDAM	\$50,000 face value	\$15.62/1/32	\$878	3pts
T-Bills	CME	\$1,000,000	\$25/0.050	\$540	None
Eurodollars	CME	\$1,000,000	\$25/0.050	\$810	None
Indices					
S&P 500	CME	\$250 times S&P 500 Index	\$25/0.10 Pts.	\$21,563	None
NYSE Index	NYBOT	\$250 times S&P 500 Index	\$25/0.05 Pts.	\$19,000	None
Nasdaq 100	CME	\$100 times NASDAQ	\$5/0.05 Pts.	\$33,750	None
Mini Nasdaq	CME	\$20 times NASDAQ	\$10/0.50 Pts.	\$6,750	None
Mini S&P	CME	\$50 times S&P 500 Index	\$12.50/0.25 Pts	\$4,313	None
DowJones Fut	CBOT	\$10 times DJ Index	\$10/1 Pt.	\$6,750	None
Value Line	KCBT	\$100 times VL Index	\$25/0.05 Pts.	\$3,500	None
Nikkei	CME	\$ 5 times Nikkei Index	\$25/5 Pts.	\$6,750	None
GSCI	CME	\$250 times GSCI	\$12.50/0.05 Pts.	\$3,750	None
CRB	NYBOT		\$25/0.05 Pts.	\$1,500	None
Grains					
Soybeans	CBOT	5000 bushels	\$12.50/0.25¢	\$945	50¢
Soymeal	CBOT	100 tons	\$10/10¢	\$810	\$20
Bean Oil	CBOT	60,000 lbs	\$6/0.01¢	\$473	2¢
Wheat	CBOT	5000 bushels	\$12.50/0.25¢	\$743	30¢
Corn	CBOT	5000 bushels	\$12.50/0.25¢	\$473	20¢
Oats	CBOT	5000 bushels	\$12.50/0.25¢	\$270	20¢

CBOT: Chicago Board of Trade

KCBT: Kansas City Board of Trade

NYBOT: New York Board of Trade

NYNEX: New York Mercantile Exchange

CME: Chicago Mercantile Exchange

MIDAM: Mid American Exchange

If the investor has a string of losses, because of adverse price movements, his margin will decrease. To ensure that there are always funds in the account, the investor is expected to maintain a maintenance margin, which is generally lower than the initial margin. If the funds in the margin account fall below the maintenance margin, the investor will receive a margin call to replenish the funds in the account. These extra funds that have to be brought in is known as a variation margin. Maintenance margins can vary across contracts and even across different customers. Table 2, for instance, shows the relationship between maintenance and initial margins for a sampling of futures contracts from the Chicago Mercantile Exchange.

Table 2 : Initial versus Maintenance Margins

Agricultural Group	Maintenance Margin (per contract)	Initial Margin Mark Up Percentage	Initial Margin (per contract)
Corn	\$350	135%	\$473
Oats	\$200	135%	\$270
Rough Rice	\$500	135%	\$675
Soybeans	\$700	135%	\$945
Soybean Meal	\$600	135%	\$810
Soybean Oil	\$350	135%	\$473
Wheat	\$550	135%	\$743

Example: Calculating Equity and Maintenance Margins

Assume that you buy 100 wheat futures contracts on the CME and that the spot price of wheat today is \$3.15. Your initial margin can be computed based upon the \$743 per contract specified by the exchange.

Initial margin = \$743 * 100 contracts = \$74,300

Assume that the price of wheat drops to \$3.14 per bushel tomorrow. [NOTE: The solution was incorrect. It implied a drop of only 1 cent, not 10 cents. It was easier to change the question than the solution.] The contract will be marked to market, resulting in a loss to you.

$$= (\text{change in price})(\text{Bushels/contract})(\text{Number of contracts})$$

$$\begin{aligned}\text{Loss from marking to market} &= (\$3.15 - \$3.14)(5000)(100) \\ &= \$5,000\end{aligned}$$

The equity in your account is now \$69,300.

$$\text{Equity after marking to market} = \$74,300 - \$5,000 = \$69,300$$

You are still safely above the maintenance margin requirement, but a series of price drops can cause your equity to drop below the maintenance margin.

$$\text{Maintenance margin} = \$550 * 100 = \$55,000$$

If you drop below this level, you will get a margin call. Failure to meet the margin call will result in the position being liquidated.

[Note:**Price Limits: Effects on Liquidity**

The logic of price limits is that they act as a brake on the market and prevent panic buying or selling. Implicit in their use is the assumption that trading can sometimes exacerbate volatility and cause prices to swing to unjustifiably high or low levels. The problem with price limits, however, is that they do not discriminate between rational price movements (caused by shifts in the underlying demand or supply of a commodity) and irrational ones. Consequently, price limits can limit liquidity when investors need it the most and slow down the process of price adjustment.

An interesting way to frame the question on price limits is to ask whether you would be willing to pay more or less for an asset that has price limits associated with trading than for an asset without those price limits. The trade off between lower volatility (from restrictions on trading) and less liquidity will determine how you answer the question.]



Pricing of Futures Contracts

Most futures contracts can be priced on the basis of arbitrage, i.e., a price or range of prices can be derived at which investors will not be able to create positions involving the futures contract and the underlying asset that make riskless profits with no initial investment. The following sections examine the pricing relationships for a number of futures contracts.

a. Perishable Commodities

Perishable commodities offer the exception to the rule that futures contracts are priced on the basis of arbitrage, since the commodity has to be storable for arbitrage to be feasible. On a perishable futures contract, the futures price will be influenced by:

(i) the expected spot price of the underlying commodity:

If the spot price on the underlying commodity is expected to increase before the expiration of the futures contract, the futures prices will be greater than the current spot price of the commodity. If the spot price is expected to decrease, the futures price will be lower than the spot price.

(ii) any risk premium associated taking the futures position:

Since there is a buyer and a seller on a futures contract, the size and the direction of the risk premium will vary from case to case and will depend upon whether the buyer is viewed as providing a service to the seller or vice versa. In an agricultural futures contract, where farmers or producers are the primary sellers of futures contracts and individual investors are the buyers, it can be argued that the latter are providing a service to the former and thus should be rewarded. In this scenario, the futures price will be lower than the expected spot price.

$$\text{Futures price} = \text{Spot Price} - \text{Expected Risk Premium}$$

In this type of relationship between futures and spot prices, prices are said to exhibit 'normal backwardation'.

In a futures contract, where buyers of the futures contract are industrial users (a good example would be Hershey's, a chocolate manufacturer, buying sugar futures to lock in favorable prices) and the sellers are individual investors, the buyers are being provided the service and the sellers could demand a reward, leading to a risk premium that is positive. In this case, the futures price will be greater than the expected spot price (assuming flat expectations) and futures prices are said to exhibit 'normal contango'.

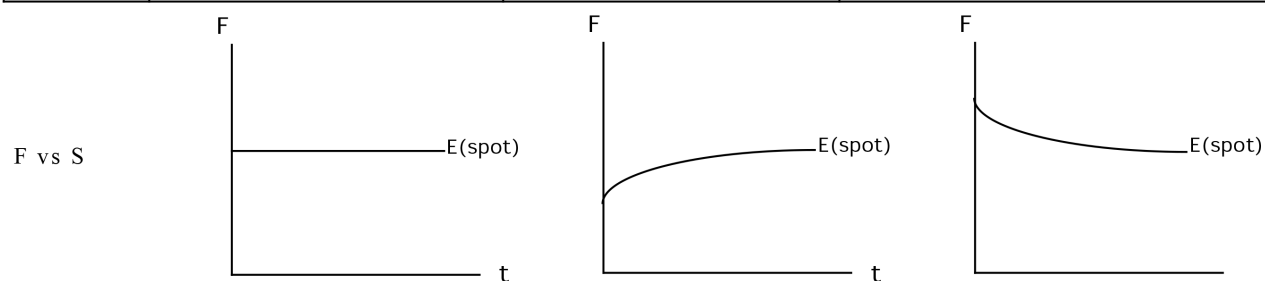
In most modern commodity futures markets, neither sellers nor buyers are likely to be dominated by users or producers, and the net benefit can accrue to either buyers or sellers and there is no a priori reason to believe that risk premiums have to be positive or negative. In fact, if buyers and sellers are both speculating on the price, rather than hedging output or input needs, the net benefit can be zero, leading to a zero risk premium. In such a case the futures price should be equal to the expected spot price.

These three possible scenarios for the futures price, relative to the expected spot price, are graphed in Figure below. The empirical evidence from commodity futures markets is mixed. An early study by Houthaker found that futures prices for commodities were generally lower than the expected spot prices, a finding that is consistent with a 'normal backwardation'. Telser and Gray, however, report contradictory evidence from the wheat and corn futures markets.

Futures on perishable commodities

$$F = E(S_t) + \text{Risk premium}$$

	Expectations Hypothesis	Normal Backwardation	Normal Contango
Assumptions	1. Investors are risk-neutral	1. Hedgers are net short 2. Speculators are net long	1. Hedgers are net long 2. Speculators are net short
Futures price	$F = E(S_t)$	$F < E(S_t)$	$F > E(S_t)$

**b. Storable Commodities**

The distinction between storable and perishable goods is that storable goods can be acquired at the spot price and stored till the expiration of the futures contract, which is the practical equivalent of buying a futures contract and taking delivery at expiration. Since the two approaches provide the same result, in terms of having possession of the commodity at expiration, the futures contract, if priced right, should cost the same as a strategy of buying and storing the commodity. The two additional costs of the latter strategy are as follows.

- (i) Since the commodity has to be acquired now, rather than at expiration, there is an added financing cost associated with borrowing the funds needed for the acquisition now.

$$\text{Added Interest Cost} = (\text{Spot price})[1 + \text{Interest Rate}]^{\text{Life of Futures contract}} - 1]$$

- (ii) If there is a storage cost associated with storing the commodity until the expiration of the futures contract, this cost has to be reflected in the strategy as well. In addition, there may be a benefit to having physical ownership of the commodity. This benefit is called the convenience yield and will reduce the futures price. The net storage cost is defined to be the difference between the total storage cost and the convenience yield.

If F is the futures contract price, S is the spot price, r is the annualized interest rate, t is the life of the futures contract and k is the net annual storage costs (as a percentage of the spot price) for the commodity, the two equivalent strategies and their costs can be written as follows.

Strategy 1: Buy the futures contract. Take delivery at expiration. Pay $\$F$.



Strategy 2: Borrow the spot price (S) of the commodity and buy the commodity. Pay the additional costs.

(a) Interest cost = $S[(1+r)^t - 1]$

(b) Cost of storage, net of convenience yield = $S k t$

If the two strategies have the same costs,

$$= S[(1+r)^t - 1] + S k t$$

$$F^* = S[(1+r)^t + k t]$$

This is the basic arbitrage relationship between futures and spot prices. Any deviation from this arbitrage relationship should provide an opportunity for arbitrage, i.e., a strategy with no risk and no initial investment, and for positive profits. These arbitrage opportunities are described in Figure .

This arbitrage is based upon several assumptions. First, investors are assumed to borrow and lend at the same rate, which is the riskless rate. Second, when the futures contract is over priced, it is assumed that the seller of the futures contract (the arbitrageur) can sell short on the commodity and that he can recover, from the owner of the commodity, the storage costs that are saved as a consequence. To the extent that these assumptions are unrealistic, the bounds on prices within which arbitrage is not feasible expand. Assume, for instance, that the rate of borrowing is r_b and the rate of lending is r_a , and that short seller cannot recover any of the saved storage costs and has to pay a transactions cost of t_s . The futures price will then fall within a bound.

$$(S - t_s)(1 + r_a)^t < F^* < S((1 + r_b)^t + k t)$$

If the futures price falls outside this bound, there is a possibility of arbitrage and this is illustrated after below figure.

$$F^* = S((1+r)^t + k t)$$

If $F > F^*$			If $F < F^*$	
Time	Action	Cashflows	Action	Cashflows
Now:	1. Sell futures contract	0	1. Buy futures contract	0
	2. Borrow spot price at riskfree r	S	2. Sell short on commodity	S
	3. Buy spot commodity	$-S$	3. Lend money at riskfree rate	$-S$
At t :	1. Collect commodity; Pay storage cost.	$-S k t$	1. Collect on loan	$S(1+r)^t$
	2. Deliver on futures contract	F	2. Take delivery of futures contract	$-F$
	3. Pay back loan	$-S(1+r)^t$	3. Return borrowed commodity; Collect storage costs	$+S k t$
NCF=		$F - S((1+r)^t + k t) > 0$		$S((1+r)^t + k t) - F > 0$

Key inputs:

F^* = Theoretical futures price

F = Actual futures price

S = Spot price of commodity

r = Riskless rate of interest (annualized)

t = Time to expiration on the futures contract

k = Annualized carrying cost, net of convenience yield (as % of spot price)

Key assumptions

1. The investor can lend and borrow at the riskless rate.
2. There are no transactions costs associated with buying or selling short the commodity.
3. The short seller can collect all storage costs saved because of the short selling.

Fig. Storable Commodity Futures: Pricing and Arbitrage

Modified Assumptions

- Investor can borrow at r_b ($r_b > r$) and lend at r_a ($r_a < r$).
- The transactions cost associated with selling short is t_s (where t_s is the dollar transactions cost).
- The short seller does not collect any of the storage costs saved by the short selling.

$$F_h^* = S ((1+r_b)^t + k t)$$

$$F_l^* = (S-t_s) (1+r_a)^t$$

If $F > F_h^*$

If $F < F_l^*$

Time	Action	Cashflows	Action	Cashflows
Now:	1. Sell futures contract	0	1. Buy futures contract	0
	2. Borrow spot price at r_b	S	2. Sell short on commodity	S - t_s
	3. Buy spot commodity	-S	3. Lend money at r_a	-(S - t_s)
At t:	1. Collect commodity from storage	-Skt	1. Collect on loan	(S- t_s)(1+ r_a) ^t
	2. Delivery on futures contract	F	2. Take delivery of futures contract	-F
	3. Pay back loan	-S(1+ r_b) ^t	3. Return borrowed commodity; Collect storage costs	0
NCF=		F-S((1+r_b)^t - kt)> 0		(S-t_s) (1+r_a)^t - F > 0

F_H = Upper limit for arbitrage bound on futures prices

F_L = Lower limit for arbitrage bound on futures prices

Fig. Storable commodity futures: pricing and arbitrage with modified assumptions

c. Stock Index Futures

Futures on stock indices have become an important and growing part of most financial markets. Today, you can buy or sell futures on the Dow Jones, the S&P 500, the NASDAQ and the Value Line indices.

An index future entitles the buyer to any appreciation in the index over and above the index futures price and the seller to any depreciation in the index from the same benchmark. To evaluate the arbitrage pricing of an index future, consider the following strategies.

Strategy 1: Sell short on the stocks in the index for the duration of the index futures contract. Invest the proceeds at the riskless rate. (This strategy requires that the owners of the index be compensated for the dividends they would have received on the stocks.)

Strategy 2: Sell the index futures contract. Both strategies require the same initial investment, have the same risk and should provide the same proceeds. Again, if S is the spot price of the index, F is the futures price, y is the annualized dividend yield on the stock and r is the riskless rate, the cash flows from the two contracts at expiration can be written.

$$F^* = S(1 + r - y)^t$$

If the futures price deviates from this arbitrage price, there should be an opportunity from arbitrage. This is illustrated in Figure below.

This arbitrage is conditioned on several assumptions. First, it, like the commodity futures arbitrage, assumes that investors can lend and borrow at the riskless rate. Second, it ignores transactions costs on both buying stock and selling short on stocks. Third, it assumes that the dividends paid on the stocks in the index are known with certainty at the start of the period. If these assumptions are unrealistic, the index futures arbitrage will be feasible only if prices fall outside a band, the size of which will depend upon the seriousness of the violations in the assumptions.



Assume that investors can borrow money at r_b and lend money at r_a and that the transactions costs of buying stock is t_c and selling short is t_s . The band within which the futures price must stay can be written as:

$$(S - t_s)(1 + r_a - y)^t < F^* < (S + t_c)(1 + r_b - y)^t$$

The arbitrage that is possible if the futures price strays outside this band is illustrated in Figure below.

In practice, one of the issues that you have to factor in is the seasonality of dividends since the dividends paid by stocks tend to be higher in some months than others. Figure below graphs out dividends paid as a percent of the S&P 500 index on U.S. stocks in 2000 by month of the year.

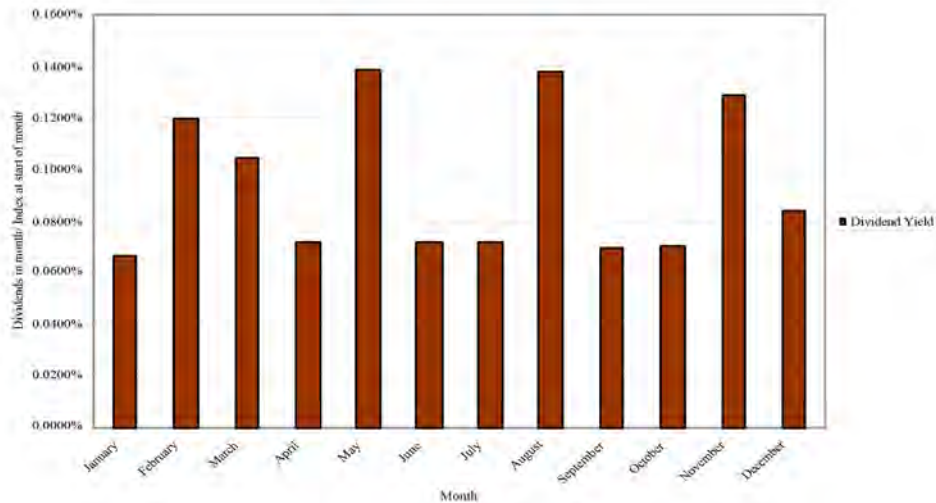


Fig. Dividend Yields by Month of Year - 2000

Thus Dividend Yields seem to peak in February, May, August & November.

$F^* = S(1+r-y)^t$			
If $F > F^*$		If $F < F^*$	
Action	Cashflows	Action	Cashflows
1. Sell futures contract	0	1. Buy futures contract	0
2. Borrow spot price of index at riskfree r	S	2. Sell short stocks in the index	S
3. Buy stocks in index	$-S$	3. Lend money at riskfree rate	$-S$
1. Collect dividends on stocks	$S((1+y)^t - 1)$	1. Collect on loan	$S(1+r)^t$
2. Delivery on futures contract	F	2. Take delivery of futures contract	$-F$
3. Pay back loan	$-S(1+r)^t$	3. Return borrowed stocks; Pay foregone dividends	$-S((1+y)^t - 1)$
$F - S(1+r-y)^t > 0$		$S(1+r-y)^t - F > 0$	

Outputs :
Theoretical futures price
Actual futures price
level of index

r = Riskless rate of interest (annualized)
 t = Time to expiration on the futures contract
 y = Dividend yield over lifetime of futures contract as % of current index level

Key Assumptions

1. The investor can lend and borrow at the riskless rate.
2. There are no transactions costs associated with buying or selling short stocks. ends are known with certainty.

Fig. Stock Index Futures: Pricing and Arbitrage

Assumptions

Investor can borrow at r_b ($r_b > r$) and lend at r_a ($r_a < r$).

Transactions cost associated with selling short is t_s (where t_s is the dollar transactions cost) and the transactions cost associated with buying the stock t_c .

		$F_h^* = (S + t_c)(1 + r_b - y)^t$ $F_l^* = (S - t_s)(1 + r_a - y)^t$	
If $F > F_h^*$		If $F < F_l^*$	
Action	Cashflows	Action	Cashflows
1. Sell futures contract	0	1. Buy futures contract	0
2. Borrow spot price at r_b	$S + t_c$	2. Sell short stocks in the index	$S - t_s$
3. Buy stocks in the index	$-S - t_c$	3. Lend money at r_a	$-(S - t_s)$
1. Collect dividends on stocks	$S((1 + y)^t - 1)$	1. Collect on loan	$(S - t_s)(1 + r_a)^t$
2. Delivery on futures contract	F	2. Take delivery of futures contract	$-F$
3. Pay back loan	$-(S + t_c)(1 + r_b)^t$	3. Return borrowed stocks; Pay foregone dividends	$-S((1 + y)^t - 1)$
$F - (S + t_c)(1 + r_b - y)^t > 0$		$(S - t_s)(1 + r_a - y)^t - F > 0$	

F_h = Upper limit for arbitrage bound on futures prices

F_l = Lower limit for arbitrage bound on futures prices

Fig. Stock Index Future: Pricing and Arbitrage with modified assumptions

d. Treasury Bond Futures

The treasury bond futures traded on the CBOT require the delivery of any government bond with a maturity greater than fifteen years, with a no-call feature for at least the first fifteen years. Since bonds of different maturities and coupons will have different prices, the CBOT has a procedure for adjusting the price of the bond for its characteristics. The conversion factor itself is fairly simple to compute and is based upon the value of the bond on the first day of the delivery month, with the assumption that the interest rate for all maturities equals 8% per annum (with semi-annual compounding). The following example calculates the conversion factor for a 9% coupon bond with 18 years to maturity.

Example: Calculation Conversion Factors for T.Bond futures

Consider a 9% coupon bond with 20 years to maturity. Working in terms of a \$100 face value of the bond, the value of the bond can be written as follows, using the interest rate of 8%.

$$PV \text{ of Bond} = \sum_{t=0.5}^{t=20} \frac{4.50}{(1.08)^t} + \frac{100}{(1.08)^{20}} = \$111.55$$

The conversion factor for this bond is 109.90. Generally speaking, the conversion factor will increase as the coupon rate increases and with the maturity of the delivered bond.

The Delivery Option and the Wild Card Play

This feature of treasury bond futures, i.e., that any one of a menu of treasury bonds can be delivered to fulfill the obligation on the bond, provides an advantage to the seller of the futures contract. Naturally,



the cheapest bond on the menu, after adjusting for the conversion factor, will be delivered. This delivery option has to be priced into the futures contract.

There is an additional option embedded in treasury bond futures contracts that arises from the fact that the T.Bond futures market closes at 2 p.m., whereas the bonds themselves continue trading until 4 p.m. The seller does not have to notify the clearing house until 8 p.m. about his intention to deliver. If bond prices decline after 2 p.m., the seller can notify the clearing house of intention to deliver the cheapest bond that day. If not, the seller can wait for the next day. This option is called the wild card play.

Valuing a T.Bond Futures Contract

The valuation of a treasury bond futures contract follows the same lines as the valuation of a stock index future, with the coupons of the treasury bond replacing the dividend yield of the stock index. The theoretical value of a futures contract should be –

$$F^* = (S - PVC)(1 + r)^t$$

where,

F^* = Theoretical futures price for Treasury Bond futures contract

S = Spot price of Treasury bond

PVC = Present Value of coupons during life of futures contract

r = Riskfree interest rate corresponding to futures life

t = Life of the futures contract

If the futures price deviates from this theoretical price, there should be the opportunity for arbitrage. These arbitrage opportunities are illustrated in Figure below.

This valuation ignores the two options described above - the option to deliver the cheapest-to-deliver bond and the option to have a wild card play. These give an advantage to the seller of the futures contract and should be priced into the futures contract. One way to build this into the valuation is to use the cheapest deliverable bond to calculate both the current spot price and the present value of the coupons. Once the futures price is estimated, it can be divided by the conversion factor to arrive at the standardized futures price.

$F^* = (S - PVC)(1 + r)^t$				
If $F > F^*$			If $F < F^*$	
Time	Action	Cashflows	Action	Cashflows
Now:	1. Sell futures contract	0	1. Buy futures contract	0
	2. Borrow spot price of bond at riskfree r	S	2. Sell short treasury bonds	S
	3. Buy treasury bonds	$-S$	3. Lend money at riskfree rate	$-S$
Till t :	1. Collect coupons on bonds; Invest	$PVC(1 + r)^t$	1. Collect on loan	$S(1 + r)^t$
	2. Deliver the cheapest bond on contract	F	2. Take delivery of futures contract	$-F$
	3. Pay back loan	$-S(1 + r)^t$	3. Return borrowed bonds; Pay foregone coupons w/interest	$-PVC(1 + r)^t$
NCF=		$F - (S - PVC)(1 + r)^t > 0$		$(S - PVC)(1 + r)^t - F > 0$

Key inputs:

F^* = Theoretical futures price

F = Actual futures price

S = Spot level of treasury bond

r = Riskless rate of interest (annualized)

t = Time to expiration on the futures contract

PVC = Present Value of Coupons on Bond during life of futures contract

Key assumptions

1. The investor can lend and borrow at the riskless rate.
2. There are no transactions costs associated with buying or selling short bonds.

Fig. Treasury Bond Futures: Pricing and Arbitrage

e. Currency Futures

In a currency futures contract, you enter into a contract to buy a foreign currency at a price fixed today. To see how spot and futures currency prices are related, note that holding the foreign currency enables the investor to earn the risk-free interest rate (R_f) prevailing in that country while the domestic currency earns the domestic risk-free rate (R_d). Since investors can buy currency at spot rates and assuming that there are no restrictions on investing at the risk-free rate, we can derive the relationship between the spot and futures prices. Interest rate parity relates the differential between futures and spot prices to interest rates in the domestic and foreign market.

$$\frac{\text{Futures Price}_{d,f}}{\text{Spot Price}_{d,f}} = \frac{(1 + R_d)}{(1 + R_f)}$$

where $\text{Futures Price}_{d,f}$ is the number of units of the domestic currency that will be received for a unit of the foreign currency in a forward contract and $\text{Spot Price}_{d,f}$ is the number of units of the domestic currency that will be received for a unit of the same foreign currency in a spot contract. For instance, assume that the one-year interest rate in the United States is 5% and the one-year interest rate in Germany is 4%. Furthermore, assume that the spot exchange rate is \$0.65 per Deutsche Mark. The one-year futures price, based upon interest rate parity, should be as follows:

$$\frac{\text{Futures Price}_{d,f}}{\$0.65} = \frac{(1.05)}{(1.04)}$$

resulting in a futures price of \$0.65625 per Deutsche Mark.

Why does this have to be the futures price? If the futures price were greater than \$0.65625, say \$0.67, an investor could take advantage of the mispricing by selling the futures contract, completely hedging against risk and ending up with a return greater than the risk-free rate. When a riskless position yields a return that exceeds the risk-free rate, it is called an **arbitrage position**. The actions the investor would need to take are summarized in Table 34.3, with the cash flows associated with each action in brackets next to the action.

Table 3: Arbitrage when currency futures contracts are mispriced

Forward Rate Mispricing	Actions to take today	Actions at expiration of futures contract
If futures price > \$0.65625 e.g. \$0.67	1. Sell a futures contract at \$0.67 per Deutsche Mark. (\$0.00) 2. Borrow the spot price in the U.S. domestic markets @ 5%. (+\$0.65) 3. Convert the dollars into Deutsche Marks at spot price. (-\$0.65/+1 DM) 4. Invest Deutsche Marks in the German market @ 4%. (-1 DM)	1. Collect on Deutsche Mark investment. (+1.04 DM) 2. Convert into dollars at futures price. (-1.04 DM/+ \$0.6968) 3. Repay dollar borrowing with interest. (-\$0.6825) Profit = \$0.6968 - \$0.6825 = \$ 0.0143



If futures price < \$0.65625 e.g. \$0.64	1. Buy a futures price at \$0.64 per Deutsche Mark. (\$0.00) 2. Borrow the spot rate in the German market @4%. (+1 DM) 3. Convert the Deutsche Marks into Dollars at spot rate. (-1 DM/+\$.65) 4. Invest dollars in the U.S. market @ 5%. (-\$.65)	1. Collect on Dollar investment. (+\$.6825) 2. Convert into dollars at futures price. (-\$.6825/1.0664 DM) 3. Repay DM borrowing with interest. (1.04 DM) Profit = 1.0664 - 1.04 = 0.0264 DM

The first arbitrage of Table 5 results in a riskless profit of \$0.0143, with no initial investment. The process of arbitrage will push down futures price towards the equilibrium price.

If the futures price were lower than \$0.65625, the actions would be reversed, with the same final conclusion. Investors would be able to take no risk, invest no money and still end up with a positive cash flow at expiration. In the second arbitrage of Table 34.3, we lay out the actions that would lead to a riskless profit of .0164 DM.

Effects of Special Features in Futures Contracts

The arbitrage relationship provides a measure of the determinants of futures prices on a wide range of assets. There are however some special features that affect futures prices. One is the fact that futures contracts require marking to the market, while forward contracts do not. Another is the existence of trading restrictions, such as price limits on futures contracts. The following section examines the pricing effects of each of these special features.

a. Futures versus Forward Contracts

As described earlier in this section, futures contracts require marking to market while forward contracts do not. If interest rates are constant and the same for all maturities, there should be no difference between the value of a futures contract and the value of an equivalent forward contract. When interest rates vary unpredictably, forward prices can be different from futures prices. This is because of the reinvestment assumptions that have to be made for intermediate profits and losses on a futures contract, and the borrowing and lending rates assumptions that have to be made for intermediate losses and profits, respectively. The effect of this interest rate induced volatility on futures prices will depend upon the relationship between spot prices and interest rates. If they move in opposite directions (as is the case with stock indices and treasury bonds), the interest rate risk will make futures prices greater than forward prices. If they move together (as is the case with some real assets), the interest rate risk can actually counter price risk and make futures prices less than forward prices. In most real world scenarios, and in empirical studies, the difference between futures and forward prices is fairly small and can be ignored.

There is another difference between futures and forward contracts that can cause their prices to deviate and it relates to credit risk. Since the futures exchange essentially guarantees traded futures contracts, there is relatively little credit risk. Essentially, the exchange has to default for buyers or sellers of contracts to not be paid. Forward contracts are between individual buyers and sellers. Consequently, there is potential for significant default risk which has to be taken into account when valuing a forward contract.

b. Trading Restrictions

The existence of price limits and margin requirements on futures contract are generally ignored in the valuation and arbitrage conditions described in this chapter. It is however possible that these restrictions on trading, if onerous enough, could impact value. The existence of price limits, for instance, has two effects. One is that it might reduce the volatility in prices, by protecting against market overreaction to information and thus make futures contracts more valuable. The other is that it makes futures contracts less liquid and this may make them less valuable. The net effect could be positive, negative or neutral.

The value of a futures contract is derived from the value of the underlying asset. The opportunity for arbitrage will create a strong linkage between the futures and spot prices; and the actual relationship will depend upon the level of interest rates, the cost of storing the underlying asset and any yield that can be made by holding the asset. In addition the institutional characteristics of the futures markets, such as price limits and 'marking to market', as well as delivery options, can affect the futures price.

In theory, we make the unrealistic assumption that a person who sells short (i.e. borrows somebody else's property and sells it now) will be able to collect the storage costs saved by the short sales from the other party to the transaction.

Application of Derivatives in various Sectors/Types of Industries

Derivatives as a hedging tool in asset/liability management are very attractive, though it has been controversial recently. Asset/liability management is of greatest interest to depository intermediaries, contractual intermediaries, and multinational corporations. Commercial banks and thrift institutions are depository intermediaries because their sources of loanable funds consist of deposits received from businesses, households, and the government. Life insurance companies, the best known contractual intermediaries, enter into contracts with their customers to promote savings and/or financial protection against loss of life. Compared to traditional portfolio adjustment methods, hedging by using financial derivatives has particular strengths, including high speed, lower transaction costs, and no increased credit risk in management of (interest rate) risks (Morris and Merfeld, 1988). A survey on the typical use of financial derivatives by these institutions is placed for the following sectors/industries:

- (i) Use of Financial Derivatives by Commercial Banks
- (ii) Use of Financial Derivatives by Thrift Institutions
- (iii) Use of Financial Derivatives by Life Insurance Companies
- (iv) Implications of Financing Agriculture by Using Derivatives

(i) Use of Financial Derivatives by Commercial Banks

Commercial banks were the earliest and are also the most sophisticated users of financial derivatives. They are not only end-users, but also dealers of derivatives. During the past few years, the use of derivatives in the U.S. banking industry has grown rapidly (Edwards and Eller, 1995). From 1990 to the end of the first quarter of 1995, total assets of those US banks involved in derivatives grew almost 35%, from \$2.3 trillion to \$3.1 trillion. During the same period, the notional amounts of derivative contracts at US banks almost tripled, rising from \$6.8 trillion to almost \$18 trillion.

However, the number of banks involved in derivatives is still relatively small, about 600 as of March 31, 1995. A primary reason for the low participation rate seems to be the large amount of intellectual and reputational capital required to develop and maintain a comprehensive and knowledgeable derivatives trading function (Gunther and Siems, 1995). Typically, only the large institutions can gather the necessary resources to produce extensive derivative trading operations. The available data confirms that the largest banks account for most of the activity: The top fifteen banks hold more than 95 percent of derivative contracts (as measured by notional amounts) of the US banking industry. Many argue that the positive association between bank capital and derivative activities is comforting from a regulatory perspective (Gunther and Siems, 1995).

Gunther and Siems (1995) explored the determining factors motivating banks' derivative usage. Potential effectiveness in hedging risks is claimed to be one of the strongest motivations for using derivatives. Hedging devices vary depending on users' balance sheet structure. Banks offer a wider array of financial services than any other type of financial institutions. The majority of assets are loans (70.4% in 1990). Most short-term loans and term loans have variable rate, but some term loans have a fixed-rate. Long-term security holdings are significant (total proportion of all kinds of security holding is 17.9% in 1990). Interest-bearing deposits, the largest form of liabilities for commercial banks (78.2% in 1990), primarily consists of time and saving deposits. Demand deposits are another important source of liabilities (14.4% in 1990). Traditionally,



depository institutions have had longer average maturities on the asset side than on the liability side, and a rise in the interest rate would harm banks (Shaffer, 1991). Today, it is very difficult to specify a maturity structure generally applied to banks since they have diversified assets and liabilities, partly attributable to recent deregulation. Commercial banks still suffer funding gaps, though it may be negative or positive. Banks must manage the interest rate risk arising from the negative or positive gap or duration position in their assets and/or liabilities.

Many commercial banks actively use financial futures to manage their asset and liability price risks. Banks with a portfolio of fixed-rate assets may wish to hedge prices of these assets against a rising interest rate. Equally important, hedging against a rising interest rate by lenders can help lower default risk if increases in market rates are not reflected in the rate paid by the borrower. Two ways available are to fix the cost of financing or to prevent the portfolio from further price erosion (Powers and Castellino, 1991). Since a bank cannot always easily identify the exact source of funds used to finance a portfolio, it often may choose to hedge the asset itself. Consequently, the bank can sell an appropriate amount of underlying interest rate futures (usually long-term). The bank thus effectively unlocks the return on a fixed asset, matching the unlocked cost of liabilities that finance the asset. In another case, when a bank is concerned that liability costs may rise faster than asset returns, it may choose to protect its interest spread. In hedging a bank's interest spread it could be easier to lock in the cost of funding than to hedge particular assets. Short position in Eurodollar and T-bill futures contracts can be used since they more closely coincide with the nature of a bank's liabilities. The increase in cost of loanable funds would be offset by gains in futures contracts.

Some commercial banks may be more concerned about falling rates. Many commercial banks usually make nice profits as rates rise, because the rates of return on many of their assets (prime rate commercial loans) can be adjusted daily but the cost of liabilities does not change until the liability matures. Quite understandably, the rates at which the liabilities roll over often does not fall as fast as the prime rate on a large portion of the bank's assets. To deal with the threat of falling rates, a bank can buy futures contracts, matching the maturity of the existing portfolio of CDs or other variable rate liabilities. Another use of financial futures is in pre-refunding existing assets when rates are expected to fall. Essentially, the bank can purchase futures to lock in the future reinvestment rate. If interest rates move lower between the time the hedge is secured and reinvestment, the hedger's profit in the futures market helps reduce the cost of investments. Rebell and Gordon (1984) detail many more specific considerations of hedging strategies by using financial futures.

Listed interest rate options should be very attractive to banks as a hedging tool because of the contingent nature of many of their assets and liabilities (Ezell 1989). The two basic options are puts and calls. A call option gives the owner the right to buy a particular good at a certain price, with that right lasting until a specified date. A put option gives the owner the right to sell a particular good at a certain price, with that right lasting until a specified date.

The first use of interest rate options in bank asset management involves reducing the risk of a portfolio expansion through the sale of calls or, less frequently, the purchase of puts (against rising rates). For instance, when interest rates payable to depositors increase, the best choice available to banks is to extend out on a positively sloped yield curve (i.e., to invest on longer-term securities and earn a higher positive maturity premium) rather than downgrading the quality of their portfolio (i.e., investing on lower-rated securities typically with higher coupon yield and higher default risk). In that case, the only way available to reduce market risk (i.e., of further rising rates) and not to reduce current yield is to sell the call against position. Interest rate futures are sharply discounted relative to cash instruments in the case of a positively sloped yield curve and thus unacceptable. But the sale of call will bring additional premium income (completely or partially) to offset the depreciation of the portfolio. This proves effective during a period of time when premium levels are rather high with regard to the volatility actually experienced. In situations where banks only want to run the least possible loss in the hedged asset position, buying put is generally preferable to either selling call or futures. The put hedge can flexibly lock in the floor price of the asset portfolio, and even prevent your portfolio from any direct price erosion at the expense of a premium.

Another good application is the hedging of a prime rate loan. Though banks usually have a large portion of their balance sheets already in a natural hedge (Powers and Castelino, 1991), it still could squeeze bank profits in the short run since earnings on these assets may not be adjusted as quickly as the rising cost of funds. Buying T-bill puts will provide protection against rising rates, and will prove better than other types of hedging methods when the prime rate adjustment in falling rate markets become sticky with regard to the rates on short-term securities. Also note that interest rate swaps generally would be better than interest rate options for hedging maturity mismatch of banks' assets and liabilities if the mismatch can be expected to last for a longer time. However, due to the high transaction cost and lack of liquidity of swaps during fluctuating markets, interest rate option strategies may be preferable if the assets must be hedged quickly or if the assets are expected to be sold after a relatively short holding period.

Interest rate options can also play a unique role in hedging asset risks of a contingent nature. One of the best examples is to hedge loan commitments (Leatham and Baker, 1984). Lenders frequently approve loans, such as mortgages, and allow a period of time for the applicant to accept or reject the loan. In other word, approval of a loan may implicitly be writing and giving to the potential borrower a put option for, say, 30 to 45 days. A lender could purchase a put option to hedge this risk.

The use of interest rate options on the liability side of bank management is for the most part quite similar to the application on the asset side, except they tend to be on the opposite direction and tend to be more oriented toward the short-term securities. Obviously, banks can use interest rate options or futures to hedge floating-rate liabilities and issuance of short-term CDs. In the former case, banks are forced to use the T-bill options or Eurodollar options since there are no listed options on CDs. As in asset hedging, in the situations where the basis (between futures and cash) is expected to move adversely (that is, the basis is strengthening for long hedging and weakening for short hedging), interest rate options hedge may be a good substitute for interest rate futures or cash hedge. Hedging the issuance of longer-term debt by interest rate options can at times be of particular benefit. When rates are generally expected to fall, banks are in a position to purchase calls and extend maturity of their liabilities. The institution can benefit from it whether the expected decline in rates materialize or not. Finally, gap risk, where exposure results from assets re-pricing before liabilities, can be hedged through the purchase of a call. This will allow greater profitability in the event of sharply rising rates, which may fit the overall risk structure of some banks better than the futures hedge which effectively locks in a rate.

Among OTC derivatives, commercial banks most often use interest rate swaps. Commercial banks enter into interest rate swaps for a variety of purposes. Interest rate swaps can help them reduce funding cost by benefiting from quality spread, which arises due to differences in interest rate spreads between fixed- and floating-rate credit markets. Typically, the quality spread between borrowers with higher credit ratings and smaller borrowers with lower credit ratings in fixed-rate market than the floating-rate market (Sangha, 1995). Whether they are fixed rate or floating rate payers in the swap, both counterparties can share the quality spread differential and have a lower borrowing cost if the market inefficiencies do continue to exist. However, more importantly, commercial banks can utilize interest rate swaps to manage their interest rate risk. Buying or selling swaps can serve to adjust the duration of banks' portfolio to that of their liabilities. Commercial banks can also provide more credit by using interest rate swap, partly because of greater access to some previously unexploited credit sources, and partly because of provision for better service to customers. Many customers prefer to minimize their rate risk by taking fixed-rate loans. But in the past, banks have found it difficult to extend fixed rate loans outright because their fixed rate funding costs have been high, sometimes as high as those faced by some of their customers (Das, 1989). The direct funding sources of lower cost for banks are often from money market. Thus, banks can enter into interest rate swaps agreeing to pay a fixed-rate while receiving a rate based on a floating rate index. Doing so, banks protect them from the later increase in interest rate and make offering of fixed-rate loans feasible: banks pay their debtors the received floating rate (of which a rise is concerned) from swaps and eventually actually pay a fixed-rate and meanwhile expect to receive the other fixed-rate from their loan borrowers. Commercial banks can also provide a floating rate loan, together with a swap, to the borrower. It is creating an equivalent of a fixed-rate loan to the borrower. But, by unbundling the components (the floating rate loan and the swap), banks can price each more efficiently.



It is worthy of noting that the use of financial swaps as an active hedging instrument of asset or liability management requires the capacity to enter into a swap position and subsequently reverse the original transaction. The depth of the relevant markets determines the availability of desired liquidity and the efficiency of financial swaps applied in these cases. However, banks most likely will hedge using an interest rate swap if its gap involves either an intermediate or a long-term planning horizon (Timothy and Kelly, 1995).

(ii) Use of Financial Derivatives by Thrift Institutions

Nonbank thrift institutions have a much narrower scope of business and have been highly exposed to interest rate risk. Savings and loans (S&L) are a large percentage of the thrift industry. The S&L's portfolio primarily consists of long-term fixed-rate mortgage funded by short-term liabilities. The correlation coefficient between the S&L industry's ROA and the 10-year Treasury note rate over the 1977-86 period is -0.75 (and it is statistically significant at the 2 percentage level) (Morris and Merfeld, 1988). The interest rate risk of a typical S&L is heavily dependent on the interest rate risk of its asset portfolio because the market value of liabilities is not very sensitive to changes in interest rates.

Morris and Merfeld (1988) argue that the effect of interest rate movements on the market value of mortgages can be separated into two components: a fixed-income effect and a prepayment effect. The fixed-income effect is the effect of changes in interest rate on the value of a fixed-rate mortgage holding the length of the payment stream—that is, prepayments—constants. The fixed-income effect causes the market value of a mortgage to move in the opposite direction of a change in interest rate. The payment effect, an additional effect on mortgage value caused by changes in interest rate change, modifies the fixed-income effect such that mortgages rise in value less than other fixed-income securities when interest rates fall, and mortgages fall in value more than other fixed-income securities when interest rates rise. S&L's lose when interest rates go up and gain when interest rates go down because their costs of funds rise and fall with rate changes but the receipts from fixed-rate mortgage remain constant.

Interest rate swaps may be particularly useful for hedging the interest rate risk of S&L's, in terms of S&L's investment horizons. Swaps essentially allow S&L's to change a variable-rate cost of funds into a fixed-rate cost of funds. To do so, an S&L can enter a swap by becoming the fixed-rate payer and floating-rate receiver. The swap receipts can be used to pay the S&L's variable cost of funds. Thus, interest rate changes would not affect the cost of funds. However, swaps are a good hedge for the fixed-income component of interest rate risk but not for the prepayment component. Thus, swaps are a good hedging instrument for S&L's against small changes in interest rates. But for large changes in interest rates, the prepayment component is large, too. S&L's cannot exclusively rely on swaps to hedge against interest rate risk.

To hedge interest rate risk, S&L's can also use a variety of financial futures trading on different exchanges by taking a short position, selling financial futures. Most hedging by S&L's is done using Treasury bonds or Eurodollar futures. Like interest rate swaps, financial futures are a particularly inexpensive means of hedging. However, since the maturities of financial futures range from three months to two and a half year, swaps are often thought to be better than financial futures for hedging fixed-rate mortgages against variability in interest rates. Short positions in financial futures only provide S&L's with an effective hedge against the fixed-income component of interest rate risk. Still, like swaps, short positions in financial futures cannot hedge accurately against the prepayment risk. Marshall (1990) argued that the more unpredictable the prepayment rate, the greater the advantage of futures hedging over swap hedging.

As an alternative, options can be used effectively to hedge against large interest rate risk and to protect S&L's from prepayment risk. Usually, interest rate options on futures rather than interest rate options on cash instruments are in practice. The latter has a far less liquid market. Mortgage lenders can offset the prepayment effect by buying call options to protect from falling interest rates; they can offset the prepayment effect by buying put options when interest rates rise, particularly above the mortgage coupon rate. In sum, it is possible to construct a mix of options and futures or swaps that practically manage a S&L's interest rate risk.

According to a recent Federal Home Loan Bank Board study, less than 10% of the thrift industry was actively involved in the futures and options at the end of 1986 (Frank, 1988). But the information would

be incomplete if we do not allow for the falling interest rates at that time as the most significant deterrent to institutions entering the futures and options markets. Furthermore, the data during 1984-1986 reveals that options tended to be more popular than futures to thrift institutions.

(iii) Use of Financial Derivatives by Life Insurance Companies

Life insurers invest the bulk of their funds in long-term securities such as bonds, stocks, and mortgages. But, due to the high predictability of their cash inflows (a major part of which are premiums from policyholders) and outflows, they have less uncertainty in managing their balance sheet than commercial banks and thrifts. Because of legal requirement and tradition, life insurance companies generally pursue income certainty and safety of principal, which have to rely on forecasting interest rate. Life insurers are exposed to interest rate risk particularly rising from their asset management. Thus, employment of financial derivative in their asset management is the focus of life insurers.

Some typical uses of financial futures by life insurers are illustrated by Powers and Castelino (1991). Insurance companies can use the futures market to hedge the depreciation of their assets since they usually hold a huge amount of fixed income securities. They can also use the futures market to increase the liquidity of their portfolio. A unique problem of life insurance companies is that any losses taken by life insurers in their fixed income portfolios must be charged against accumulated surplus and that lowers the amount of insurance a company can write. Financial futures can be used to help solve this problem. When rates begin to increase, a life insurer could sell futures contracts short against its existing portfolio. The decrease in value of existing portfolio can be offset by the gains from futures market when rates are higher. In this type of hedging, it is not necessary to identify futures contracts to be used for each particular cash position. Instead, only categorization of securities into major groups should be conducted.

A closer look at the use of financial derivatives by life insurers in real world is based on a valuable survey conducted in 1987 (Figlewski, 1989).

Table 4: Financial Derivatives in Use by Life Insurers (Percent of the group using the contract)

Derivatives	Larger Firms	Smaller Firms
Financial Futures	80%	25%
Financial Options	60%	12%
Financial Swaps	67%	25%
Financial Forwards (FRAs)	20%	19%

Source: Stephen Figlewski, "How Life Insurers Use Financial Futures and Options," BEST'S

Review, March 1989.

Table 5: Most Frequently Used Contract by Life Insurers (Percent of the group using the contract)

Instruments	Larger Firms Using Likely		Smaller Using Likely	Firms
	Now	In Future	Now	In Future
Money market futures (T-Bill, Eurodollar, etc.)	27%	33%	6%	19%
Currency futures	33%	13%	0%	19%
Fixed-income futures (T-bond, T-note, etc.)	80%	13%	31%	44%
Stock index futures	40%	47%	12%	31%
Stock options	27%	27%	19%	19%
Money market options	7%	3%	6%	19%
Fixed-income options	47%	40%	12%	56%



Currency options	13%	27%	0%	19%
Stock index options	13%	53%	6%	44%

Source: Stephen Figlewski, "How Life Insurers Use Financial Futures and Options," BEST'S Review, March 1989.

Tables 4 and 5 show that financial futures are substantially more widely used than options. Financial swaps are also common. This is largely because of the less contingent nature of life insurers' assets and liabilities. The most popular futures contracts are those based on fixed-income instruments and stock indexes, and the most popular options contracts are fixed-income options and stock options. In contrast, life insurers less frequently use money market futures and money market options to hedge short-term interest rate risk since their funding sources are relatively insensitive to the risk.

Many strategies can be employed by life insurers, and the following are some of the most popular. Anticipatory hedging by buying bond futures to lock in a yield in anticipation of a later purchase of actual bonds is one of the most common hedging strategies of life insurers. Another is immunization, using futures to adjust the duration of a bond portfolio. As a short futures position is added to the bond portfolio, the short position is added with a negative weighting into portfolio duration calculation and thus it can serve to lower the weighted average portfolio duration to the desired number (Leuthold, et al. 1989). To immunize a portfolio, it is necessary to adjust the portfolio so that its duration is equal to the holding period or investment horizon. Short hedging of current security position and hedging commitment period risk are also common. Writing covered calls and buying calls are two most common options strategies for life insurance companies. An option is covered when the writer owns enough of the underlying cash instruments to meet the requirements of the contract if it is exercised. A writer can also be covered by owning another call of the same class that a lower strike price. As a covered call writer, a life insurer is not required to pay any initial margin costs and aim to earn premium at the expense of giving up the right to any increase in the value of the underlying assets beyond the strike price. Buying calls, and buying puts which is another common option strategy for life insurers, help limit the loss of their portfolios and attain great leverage. Also, as we expected, speculation by uncovered long or short position or arbitrage to enhance returns are almost never employed in financial futures or option transactions.

The Risks Associated with Derivative Use

Derivatives can reduce or transfer the risks in underlying cash instruments, but they might also introduce new built-in risks. Opinions differ in whether using derivatives increase more risk to the whole financial system, which is often called system risk. The concern about the system risk is heightened by the global market linkages that have been created by the use of derivatives. Separate studies by the Group of Thirty and the Bank of England suggest that derivative products do not introduce new risks into the financial system (Wood and Shaw, 1994).

However, it is generally agreed upon that there are some new risks associated with derivatives to individual users. The major risks include credit risk, market risk, legal risk and operational risk (GAO, 1994). Credit risk is the exposure to the possibility of financial loss resulting from a counterparty's failure to meet its financial obligations. It usually exists in OTC derivatives. Clearing houses function to eliminate the credit risk for both buyers and sellers in exchanged-run transactions. Market risk is the exposure to the possibility of financial loss resulting from unfavorable movements in interest rate and currency rates as well as equity and commodity prices. Market risk is more involved in speculation than in hedging. Legal risk is the exposure to the possibility of financial loss resulting from an action by a court or by a regulatory or legislative body that invalidates a derivative contract or prior derivative transactions. Legal risk is associated primarily with OTC contracts in the US, particularly with swaps. Operations risk is the exposure to the possibility of financial loss resulting from inadequate systems, management failure, faulty controls, fraud, or human error. Operation risk may compound the effect of other risks.

(iv) Implications of Financing Agriculture by Using Derivatives

There are two basic categories of potential users of financial derivatives in agriculture: agricultural production units and financial intermediaries in agriculture. However, only the latter is the discussed herein.

Financial intermediaries in agriculture refer to commercial banks, Farm Credit System (FCS), life insurance companies, trade credit especially by agribusiness firms, individuals and sellers financing, Farmers Home Administration (FmHA), Commodity Credit Corporation (CCC) and some other governmental lending institution (Barry et al. 1995). For farm real estate loans, normally with the maturity more than 10 years and less than 40 years, FCS (16.1%), commercial banks (14.8%), life insurance companies (6%) are listed as major financing institutions, according to the data in 1995. In the contrast, in 1995, commercial banks (24.8%), individual lenders (10.7%), FCS (8.6%) are the most important sources for intermediate or short-term non-real estate farm debts.

There are various kinds of risks involved with agriculture lenders in the United States. The most significant one, as applied to most financial institutions, is interest rate risk.

Financial deregulation, changing monetary policy, and rapidly fluctuating inflation rates have made market interest rates highly variable. It effects both agricultural borrowers and lenders (Ladue and Leatham 1984). For the agricultural lenders, most commercial banks and FCS have used floating or variable rates, particularly on longer-term farm loan. Life insurance companies generally have not adopted floating rates. In recent years they typically offer loans with shorter maturities and a provision for interest rate adjustment every 5 years (Barry et al. 1995). The FmHA does not use variable rates. In sum, the major sources of credit to agriculture involve risks associated with floating-rate versus fixed-rate and short-term versus long-term loans.

From the perspectives of agricultural borrowers, they have the same kinds of interest rate risks as lenders but in the reverse directions. Conventional fixed-rate agricultural loans with no prepayment penalties protect agricultural borrowers from upward movements of interest rates and allow them to take advantage of downturns, but things have been changing. During 1980-81, bearing of interest rate risks by agricultural borrowers inflicted losses on their fixed-rate borrowing. Agricultural borrowers can manage these risks by themselves, but may be better off to transfer the risks to agricultural lenders.

Interest rate risk seriously affects the availability of agricultural credit. Based on data on non-real estate agricultural lending by commercial banks in Texas, Betubiza and Leatham (1993) showed that banks have reduced their agricultural loan portfolios in response to increased use of interest sensitive deposits after deregulation since 1980; some banks even stopped making agricultural loans. Quite logically, it can be expected that the new opportunities for agricultural lenders to manage interest rate risk provided by prudent use of financial derivative may help overturn the unsatisfactory trend.

To manage interest rate risks, large agricultural lenders such as some large commercial banks, life insurance companies, and Farm Credit Banks (FCBs) are the primary users of financial derivatives, particularly interest rate derivatives. Ways of utilizing financial derivatives by these two major agricultural lenders, commercial banks and life insurance companies are discussed as above. However, smaller commercial banks are inactive in participating in the financial derivative markets, and the agricultural banks are mostly smaller banks. Thus, there is much potential left to further finance agriculture by employing derivative instruments.

Now let's turn to specialized farm lending institutions. FCS is the most important among specialized farm lending institutions. In general, FCS is still a modest participant in financial derivative markets (FCA work group report, 1995). Most Farm Credit Banks (FCBs) use only interest rate swaps, which constitute 98 percent of off-balance sheet uses of derivatives. The total outstanding notional amount reached \$13.0 billion as of December 31, 1994, with a credit risk exposure of \$60 million. Swaps are used to lower funding costs or for interest rate management in the FCS. Two typical use of derivatives by FCS are illustrated in greater details (Pederson and Maginnis, 1985). In one example, a St. Paul FCS bank, wanted to shorten the effective maturity of FCS bond portfolio by replacing fixed-rate interest payments with a floating-rate commitment repriced at 6-month intervals. The FCS bank entered a swap and became the floating-rate payer in the swap with the reset based on the Farm Credit bond coupon rate. Later, due to the



decline of interest rates and reduced cost of 6-month FCS bonds, the FCS bank received net interest payments in each period and also improved its debt structure. Another study showed that the Treasury bill futures can be used by the Bank for Cooperatives to hedge against unanticipated increase in its 6-months ahead borrowing costs (Severn, 1985).

In sum, using derivatives is beneficial to agriculture for the following reasons:

- (1) Agricultural lenders can lower their funding cost and thus very probably reduce the interest expense of agricultural production units;
- (2) Agricultural lenders can have greater access to more capital market and thus provide more credit sources to agriculture;
- (3) Agricultural lenders can have more flexible ways to manage interest risks and thus provide loans with more favorable terms (such as lower minimum amount of a loan) to serve agricultural production;
- (4) Agricultural lenders can also reduce or transfer the risks inherent in agricultural production in other indirect ways.

Agricultural lenders, for example, can act as brokers or counterparties for agribusinesses in OTC derivative transactions, particularly in interest rate swaps (Covey, 1996). In this case, assumption of a counterparty's role is easier than as a broker. Farmers holding fixed-rate or variable rate loans can protect themselves against unfavorable interest rate movements by entering an appropriate OTC interest rate derivative contract.

Finally, there are greater disadvantages of using certain instruments when financial derivatives are applied to finance agriculture. Since agricultural banks with smaller asset levels are the biggest farm lenders (AIS-60, 1996), the higher cost may often cause financial options unfeasible to agricultural banks and thus to finance agriculture to some extent. Financial options were found to be prohibitively expensive to hedge interest rates (Leatham and Baker, 1988). In contrast, inexpensive means of hedging, like swaps and futures, are more attractive.

The proper use of financial derivatives is beneficial to lenders and further to customers they serve. This is extremely important to prevent agriculture from financial distress which happened before in many advanced/developed countries.

HEDGE FUND

Hedge funds refer to funds that can use one or more alternative investment strategies, including hedging against market downturns, investing in asset classes such as currencies or distressed securities, and utilizing return-enhancing tools such as leverage, derivatives, and arbitrage. It can take both long and short positions, use arbitrage, buy and sell undervalued securities, trade options or bonds, and invest in almost any opportunity in any market where it foresees impressive gains at reduced risk.

At a time when world stock markets appear to have reached excessive valuations and may be due for further correction, hedge funds provide a viable alternative to investors seeking capital appreciation as well as capital preservation in bear markets.

Hedge fund strategies vary enormously -- many hedge against downturns in the markets -- especially important today with volatility and anticipation of corrections in overheated stock markets. The primary aim of most hedge funds is to reduce volatility and risk while attempting to preserve capital and deliver positive returns under all market conditions. The vast majority of hedge funds make consistency of return, rather than magnitude, their primary goal.

There are approximately 14 distinct investment strategies used by hedge funds, each offering different degrees of risk and return. A macro hedge fund, for example, invests in stock and bond markets and other investment opportunities, such as currencies, in hopes of profiting on significant shifts in such things as global interest rates and countries' economic policies. A macro hedge fund is more volatile but potentially faster growing than a distressed-securities hedge fund that buys the equity or debt of companies about to enter or exit financial distress. An equity hedge fund may be global or country

specific, hedging against downturns in equity markets by shorting overvalued stocks or stock indexes. A relative value hedge fund takes advantage of price or spread inefficiencies. Knowing and understanding the characteristics of the many different hedge fund strategies is essential to capitalizing on their variety of investment opportunities.

It is important to understand the differences between the various hedge fund strategies because all hedge funds are not the same -- investment returns, volatility, and risk vary enormously among the different hedge fund strategies. Some strategies which are not correlated to equity markets are able to deliver consistent returns with extremely low risk of loss, while others may be as or more volatile than mutual funds. A successful fund of funds recognizes these differences and blends various strategies and asset classes together to create more stable long-term investment returns than any of the individual funds.

Key Characteristics of Hedge Funds

- Hedge funds utilize a variety of financial instruments to reduce risk, enhance returns and minimize the correlation with equity and bond markets. Many hedge funds are flexible in their investment options (can use short selling, leverage, derivatives such as puts, calls, options, futures, etc.).
- Hedge funds vary enormously in terms of investment returns, volatility and risk. Many, but not all, hedge fund strategies tend to hedge against downturns in the markets being traded.
- Many hedge funds have the ability to deliver non-market correlated returns.
- Many hedge funds have as an objective consistency of returns and capital preservation rather than magnitude of returns.
- Most hedge funds are managed by experienced investment professionals who are generally disciplined and diligent.
- Pension funds, endowments, insurance companies, private banks and high net worth individuals and families invest in hedge funds to minimize overall portfolio volatility and enhance returns.
- Most hedge fund managers are highly specialized and trade only within their area of expertise and competitive advantage.
- Hedge funds benefit by heavily weighting hedge fund managers' remuneration towards performance incentives, thus attracting the best brains in the investment business. In addition, hedge fund managers usually have their own money invested in their fund.
- Performance of many hedge fund strategies, particularly relative value strategies, is not dependent on the direction of the bond or equity markets -- unlike conventional equity or mutual funds (unit trusts), which are generally 100% exposed to market risk

The popular misconception is that all hedge funds are volatile -- that they all use global macro strategies and place large directional bets on stocks, currencies, bonds, commodities, and gold, while using lots of leverage. In reality, less than 5% of hedge funds are global macro funds. Most hedge funds use derivatives only for hedging or don't use derivatives at all, and many use no leverage.

Hedging Strategies

A wide range of hedging strategies are available to hedge funds. For example:

- selling short - selling shares without owning them, hoping to buy them back at a future date at a lower price in the expectation that their price will drop.
- using arbitrage - seeking to exploit pricing inefficiencies between related securities - for example, can be long convertible bonds and short the underlying issuer's equity.
- trading options or derivatives - contracts whose values are based on the performance of any underlying financial asset, index or other investment.
- investing in anticipation of a specific event - merger transaction, hostile takeover, spin-off, exiting of bankruptcy proceedings, etc.



- investing in deeply discounted securities - of companies about to enter or exit financial distress or bankruptcy, often below liquidation value.
- Many of the strategies used by hedge funds benefit from being non-correlated to the direction of equity markets

Hedge Fund Styles

The predictability of future results shows a strong correlation with the volatility of each strategy. Future performance of strategies with high volatility is far less predictable than future performance from strategies experiencing low or moderate volatility.

Aggressive Growth: Invests in equities expected to experience acceleration in growth of earnings per share. Generally high P/E ratios, low or no dividends; often smaller and micro cap stocks which are expected to experience rapid growth. Includes sector specialist funds such as technology, banking, or biotechnology. Hedges by shorting equities where earnings disappointment is expected or by shorting stock indexes. Tends to be "long-biased." Expected Volatility: **High**

Distressed Securities: Buys equity, debt, or trade claims at deep discounts of companies in or facing bankruptcy or reorganization. Profits from the market's lack of understanding of the true value of the deeply discounted securities and because the majority of institutional investors cannot own below investment grade securities. (This selling pressure creates the deep discount.) Results generally not dependent on the direction of the markets. Expected Volatility: **Low - Moderate**

Emerging Markets: Invests in equity or debt of emerging (less mature) markets that tend to have higher inflation and volatile growth. Short selling is not permitted in many emerging markets, and, therefore, effective hedging is often not available, although Brady debt can be partially hedged via U.S. Treasury futures and currency markets. Expected Volatility: **Very High**

Funds of Hedge Funds: Mix and match hedge funds and other pooled investment vehicles. This blending of different strategies and asset classes aims to provide a more stable long-term investment return than any of the individual funds. Returns, risk, and volatility can be controlled by the mix of underlying strategies and funds. Capital preservation is generally an important consideration. Volatility depends on the mix and ratio of strategies employed. Expected Volatility: **Low - Moderate - High**

Income: Invests with primary focus on yield or current income rather than solely on capital gains. May utilize leverage to buy bonds and sometimes fixed income derivatives in order to profit from principal appreciation and interest income. Expected Volatility: **Low**

Macro: Aims to profit from changes in global economies, typically brought about by shifts in government policy that impact interest rates, in turn affecting currency, stock, and bond markets. Participates in all major markets -- equities, bonds, currencies and commodities -- though not always at the same time. Uses leverage and derivatives to accentuate the impact of market moves. Utilizes hedging, but the leveraged directional investments tend to make the largest impact on performance. Expected Volatility: **Very High**

Market Neutral - Arbitrage: Attempts to hedge out most market risk by taking offsetting positions, often in different securities of the same issuer. For example, can be long convertible bonds and short the underlying issuer's equity. May also use futures to hedge out interest rate risk. Focuses on obtaining returns with low or no correlation to both the equity and bond markets. These relative value strategies include fixed income arbitrage, mortgage backed securities, capital structure arbitrage, and closed-end fund arbitrage. Expected Volatility: **Low**

Market Neutral - Securities Hedging: Invests equally in long and short equity portfolios generally in the same sectors of the market. Market risk is greatly reduced, but effective stock analysis and stock picking is essential to obtaining meaningful results. Leverage may be used to enhance returns. Usually low or no correlation to the market. Sometimes uses market index futures to hedge out systematic (market) risk. Relative benchmark index usually T-bills. Expected Volatility: **Low**

Market Timing: Allocates assets among different asset classes depending on the manager's view of the economic or market outlook. Portfolio emphasis may swing widely between asset classes. Unpredictability of market movements and the difficulty of timing entry and exit from markets add to the volatility of this strategy. Expected Volatility: **High**

Opportunistic: Investment theme changes from strategy to strategy as opportunities arise to profit from events such as IPOs, sudden price changes often caused by an interim earnings disappointment, hostile bids, and other event-driven opportunities. May utilize several of these investing styles at a given time and is not restricted to any particular investment approach or asset class. Expected Volatility: **Variable**

Multi Strategy: Investment approach is diversified by employing various strategies simultaneously to realize short- and long-term gains. Other strategies may include systems trading such as trend following and various diversified technical strategies. This style of investing allows the manager to overweight or underweight different strategies to best capitalize on current investment opportunities. Expected Volatility: **Variable**

Short Selling: Sells securities short in anticipation of being able to re-buy them at a future date at a lower price due to the manager's assessment of the overvaluation of the securities, or the market, or in anticipation of earnings disappointments often due to accounting irregularities, new competition, change of management, etc. Often used as a hedge to offset long-only portfolios and by those who feel the market is approaching a bearish cycle. High risk. Expected Volatility: **Very High**

Special Situations: Invests in event-driven situations such as mergers, hostile takeovers, reorganizations, or leveraged buyouts. May involve simultaneous purchase of stock in companies being acquired, and the sale of stock in its acquirer, hoping to profit from the spread between the current market price and the ultimate purchase price of the company. May also utilize derivatives to leverage returns and to hedge out interest rate and/or market risk. Results generally not dependent on direction of market. Expected Volatility: **Moderate**

Value: Invests in securities perceived to be selling at deep discounts to their intrinsic or potential worth. Such securities may be out of favor or underfollowed by analysts. Long-term holding, patience, and strong discipline are often required until the ultimate value is recognized by the market. Expected Volatility: **Low - Moderate**

Forward Interest Rate Arrangement

- (a) Forward Interest Rate arrangement are contracts entered into between two parties, whereby one party will pay / charge interest at a fixed rate on the amount borrowed / lent.
- (b) Forward Interest Rate Agreements will freeze today, for the rate of interest payable / receivable on a loan / deposit to be made at a later point in time.

Example: On 01.04.2011, A Ltd enters into a Forward Rate Agreement with Bombay Bank for borrowing loan of `1,000 Crores at 10% p.a. in July 2012.

Advantages: It helps a borrower in eliminating interest rate risks associated with borrowing or investing funds. Adverse movements in the interest rates will not affect or alter the interest receipt / liability of the investor/ borrower.

Situation: Forward Interest Rate Arrangements can be entered into for —

- (a) an existing loan — for making interest payments at agreed rates from a future period; or
- (b) a prospective loan — to be taken at a later point in time.

Appropriate Interest Rate

From a given set of data on interest rates applicable for bonds with different maturity periods, how can one compute the appropriate interest rate for an intervening period- compute Forward interest rates, from interest rates on securities with different maturity periods.



Rates for Future Periods: Forward Rates are the rates of interest implied for a specific period in time in the future. These rates are implied from the prevailing interest rates for instruments with different maturity periods.

Rate Available Today = Basis for Computation: This is the rate at which an investor would earn interest on his investments for a period starting on a later date, if the rates available today for different periods would hold good.

Mathematical Notation:

$$\text{Forward Interest Rate} = \frac{R_2T_2 - R_1T_1}{T_2 - T_1}$$

Where, R_2 = Rate of Interest for the Longer Time Period

R_1 = Rate of Interest for the Shorter Time Period

T_2 = Longer Time Period

T_1 = Shorter Time Period

Example: On 01.04.2010, 1-year Government Bonds carry an interest rate of 10%, 2 Year Government Bonds carry an interest rate of 11%, and 3-Year Government Bonds carry an interest rate of 13% All the Bonds have a face value of ₹ 10 Lakhs.

(a) Comparison of 1 Year Bond and 2 Year Bond:

- Sum of ₹10 Lakh invested in one year bond would fetch ₹ 1,00,000 for Year 1. Sum of ₹10,00,000 invested today in 2 Year bond will fetch ₹ 1,10,000 p.a. for the next two years.
- ₹ 10,00,000 invested in 2 Year bond will fetch ₹ 2,20,000 totally. Therefore, the incremental interest for the second year is ₹ 1,20,000 (Cumulative Interest on a Two Year Bond ₹ 2,20,000 Less Interest for a One Year Bond ₹1,00,000)
- Therefore, interest rate expected for Year 2 for an investment of ₹10 Lakh is ₹1,20,000 or 12%
- Therefore, Forward Interest Rate for an One Year investment as at 01.04.2011 is 12%

$$\frac{R_2T_2 - R_1T_1}{T_2 - T_1} = \frac{0.11 \times 2 - 0.10 \times 1}{2 - 1} = (0.22 - 0.10) \div 1 = 0.12 \div 1 = 0.12 \text{ or } 12\%$$

(b) Comparison of 1 Year Bond and 3-Year Bond:

- ₹ 10 Lakhs invested in one year bond would fetch ₹ 1,00,000 for Year 1. Sum of ₹ 10,00,000 invested today in 3-Year bond will fetch ₹ 1,30,000 p.a. for the next three years.
- ₹ 10,00,000 invested in 3-Year bond will fetch ₹ 3,90,000 totally. Therefore, the incremental interest for the second and third year is ₹ 2,90,000 (Cumulative Interest on a 3-Year Bond ₹ 39,000 Less Interest for a One Year Bond ₹1,00,000)
- Therefore, interest rate expected for Year 2 and 3 for an investment of ₹ 10 Lakhs is ₹ 2,90,000 or ₹ 1,45,000 per annum i.e. 14.50% p.a.
- Therefore, Forward Interest Rate for a Two-Year investment as at 01.04.2010 is 14.50%

$$\frac{R_2T_2 - R_1T_1}{T_2 - T_1} = \frac{0.13 \times 3 - 0.10 \times 1}{3 - 1} = (0.39 - 0.10) \div 2 = 0.29 \div 2 = 0.145 \text{ or } 14.5\%$$

ILLUSTRATIONS

Illustration 1.

Deep is planning to invest ₹ 25,00,000 in Bank Deposits for one year. All the banks offer an interest rate of 12% p.a. for 12 month deposits. Deep has enquired deposit application forms of 4 banks, particulars of which are as follows

- Bank M: Interest will be credited at half-yearly basis.
- Bank N: Interest will be credited at quarterly rests.
- Bank O: Interest will be credited at monthly rests.
- Bank P: Interest will be credited at weekly rests.

If Deep cares for every extra rupee, which Bank will be prefer? What should be the minimum rate Bank N should offer to attract Deep's deposit?

If Bank M agrees to credit interest at continuous compounding basis, what will be return for Deep?

Solution:**1. Computation of Factors**

Compounding at	Amount (A) at the end of the period
Annual Interval / Rests	$A = P \times (1 + r)^n$
Less than Annual Interval / Rests	$A = P \times (1 + r/m)^{n \times m}$

Where A = Amount received at the end of the period (1 Year or 12 Months)

P = Amount be compounded i.e. amount invested at the beginning ₹25 Lakhs

r = Rate of Interest per annum (12% or 0.12)

n = Number of Years = 1 Year

m = Number of Compounding in a year = (2 or 4 or 12 or 52)

2. Computation of Amount Receivable by Deep

Banks	Method of Compounding	No. of compounding in an Year (m)	Amount Received
M	Half Yearly	2 Half Years	$A = P \times (1 + r/m)^{n \times m}$ $= ₹ 25,00,000 \times (1 + 0.12/2)^2$ $= ₹ 25,00,000 \times (1 + 0.06)^2$ $= ₹ 25,00,000 \times (1.06)^2$ $= ₹ 25,00,000 \times 1.1236$ $= ₹ 28,09,000$
N	Quarterly	4 Quarters	$A = P \times (1 + r/m)^{n \times m}$ $= ₹ 25,00,000 \times (1 + 0.12/4)^4$ $= ₹ 25,00,000 \times (1 + 0.03)^4$ $= ₹ 25,00,000 \times (1.03)^4$ $= ₹ 25,00,000 \times 1.12551$ $= ₹ 28,13,775$



O	Monthly	12 Months	$A = P \times (1 + r/m)^{n \times m}$ $= ₹ 25,00,000 \times (1 + 0.12/12)^{12}$ $= ₹ 25,00,000 \times (1 + 0.01)^{12}$ $= ₹ 25,00,000 \times (1.01)^{12}$ $= ₹ 25,00,000 \times 1.126825$ $= ₹ 28,17,063$
P	Weekly	52 Weeks	$A = P \times (1 + r/m)^{n \times m}$ $= ₹ 25,00,000 \times (1 + 0.12/52)^{52}$ $= ₹ 25,00,000 \times (1 + 0.002307)^{52}$ $= ₹ 25,00,000 \times (1.002307)^{52}$ $= ₹ 25,00,000 \times 1.1273$ $= ₹ 28,18,250$

Evaluation: Deep will prefer Bank P, as it offers the maximum return on investment.

3. Change in Interest Rate offered by Bank N

Minimum rate offered by Bank N should yield the maximum of the above four returns i.e. ₹ 28,18,250.

If Minimum Rate is N, then

$$\begin{aligned}A &= P \times (1 + r/m)^{n \times m} \\ \Rightarrow 28,18,250 &= 25,00,000 (1 + B/4)^4 \\ \Rightarrow (1 + B/4)^4 &= 22,54,600 \div 25,00,000 \\ \Rightarrow 1 + B/4 &= \sqrt[4]{1.1273} \\ \Rightarrow 1 + B/4 &= 1.03041 \\ \Rightarrow B/4 &= 1.03041 - 1 \\ \Rightarrow B &= 0.03041 \times 4 \\ &= 0.12164 \text{ or } 12.164\%\end{aligned}$$

Therefore, Bank N should offer deposits (at half yearly rests) at 12.164% to attract Deep's Deposit.

4. Continuous Compounding by Bank M

If Bank M offers continuous compounding facility, then amount received at the end of the year will be

$$A = P \times e^{r \times t}$$

Where, P = Amount invested at the beginning of the period = ₹ 25,00,000

E = Exponential Value (i.e. ≈ 2.71828)

r = Rate of Interest = 12% or 0.12

t = No. of Years i.e. Period/Year = 1 Year

$$\begin{aligned}A &= ₹ 25,00,000 \times e^{0.12 \times 1} \\ &= ₹ 25,00,000 \times 1.127497 \\ &= ₹ 28,18,743\end{aligned}$$

Illustration 2 .

Tripti has two investment opportunities, M and N, carrying an yield of 15% p.a. The tenor of both these investments is 3 Years.

M offers continuous compounding facility, whereas N offers yield on the basis of monthly compounding. Which offer will Tripti opt for?

If continuous compounding facility comes at a price of ₹ 180 p.a. per Lakh of deposit (chargeable at the end of the period), what will be the position?

At what price, will Tripti be indifferent to Continuous Compounding Facility and Monthly Compounding?

Solution:**1. Return on Investment Options A and B**

Particulars	Investment A	Investment B
Investment (assumed)	₹ 20,00,000	₹ 20,00,000
Amount receivable on Maturity (A)	$A = P \times (1 + r/m)^{n \times m}$ $= ₹ 20,00,000 \times (1 + 0.15/12)^{3 \times 12}$ $= ₹ 20,00,000 \times (1 + 0.0125)^{36}$ $= ₹ 20,00,000 \times (1.0125)^{36}$ $= ₹ 20,00,000 \times 1.563944 = ₹ 31,27,888$	$A = P \times e^{rt}$ $= ₹ 20,00,000 \times e^{0.15 \times 3}$ $= ₹ 20,00,000 \times e^{0.45}$ $= ₹ 20,00,000 \times 1.568312$ $= ₹ 31,36,324$
Charges payable at ₹180 p.a. per Lakh	NIL	$10 \times ₹ 180 \text{ p.a.} \times 3 \text{ Years}$ $= ₹ 5,400$
Net Amount Receivable upon Maturity	₹ 31,27,888 - ₹ NIL = ₹ 31,27,888	₹ 31,36,324 - ₹ 5,400 = ₹ 31,31,224

2. Evaluation of Investments

Case A (No charges for Continuous Compounding): Investment N is preferable, as it offers a higher return on maturity.

Case B (Charges for Continuous Compounding): Investment M is preferable, as amount receivable is higher than net amount receivable in Investment M.

3. Indifference Point

Tripti will be indifferent to Investment M and N, if

Amount Receivable under Maturity in Investment M	=	Amount Receivable under Maturity in Investment N	Less	Charges for Continuous Compounding

$$\Rightarrow ₹ 31,27,888 = ₹ 31,36,624 \text{ Less Charges}$$

$$\Rightarrow \text{Charges} = ₹ 31,36,624 \text{ Less } ₹ 31,27,888 = ₹ 8,736$$

$$\begin{aligned} \Rightarrow \text{Charges per Lakh per Annum} &= ₹ 8,736 \div (3 \text{ Years} \times 10) \\ &= ₹ 8,736 \div 30 \\ &= ₹ 291.20 \end{aligned}$$

Conclusion: The price payable for Investment N is ₹ 291.20 per Lakh per annum for Tripti to be indifferent to both the investment alternatives.

Illustration 3.

Mita Ltd will be receiving ₹ 120 Lakhs by way of interim dividend from its subsidiary in 4 months. At the end



of the year it will be receiving ₹220 Lakhs by way of final dividend and interest on loans to subsidiaries. What is the present value of such interest and dividends if the weighted average cost of capital for Mita Ltd is 13.50% and the Company discounts continuous compounding for income by way of dividends and interests?

Solution:

1. Present Value under continuous compounding approach

(Computation of Factors)

Present Value (P) = $A \times e^{-rt}$ or $A \div e^{rt}$

Where, A = Future Cash Flow

e = Exponential Value (i.e. 2.71828)

r = Rate of Interest = 13.50% or 0.135

t = No. of Years i.e. Period /Year = 4 Months / 12 Months i.e. 1/3 and
= 12 Months / 12 Months i.e. 1

2. Present Value of Cash Flows

Time	Nature of Cash Flow	Cash Flow (₹)	PV Factor at 13.50%	Discounted Cash Flow (₹)
(1)	(2)	(3)	(4) = $[1 \div e^{0.135 \times (1)/12}]$	(5) = (3)X(4)
4	Interim Dividend	1,20,00,000	0.9560 $[1 \div e^{0.135 \times 4/12}]$	₹1,14,72,000
12	Final Dividend and Interest	2,20,00,000	0.8737 $[1 \div e^{0.135 \times 12/12}]$	₹1,92,21,400
Total				₹3,06,93400

Illustration 4 .

Prabir has ₹60 Lakhs in hand. He is contemplating investment in the shares of Super Star Accessories Ltd (VAL) which is being traded at ₹ 200 per share.

Prabir expects a dividend declaration of ₹37 per share 3 months hence and a market price of ₹185 per share at the end of the year, at which Prabir plans to sell of all his holdings.

If the discount rate is 12% p.a., what will be the course of action if Prabir discounts his cash flows under continuous compounding approach and monthly discounting approach?

Solution:

Time	Nature of Cash Flow	Cash Flow	Continuous Compounding		Monthly Discounting	
			PV Factor at 12%	Discounted Cash Flow	PV Factor at 12%	Discounted Cash Flow
(1)	(2)	(3)	(4) = $[1 \div e^{0.12 \times (1)/12}]$	(5) = (3) x (4)	(6) = $[1 \div (1+12\%/12)^{(1)}]$	(7) = (3) x (6)
0	Investment (Outflow)	(60,00,000)	1 $[1 \div e^{0.12 \times 0/12}]$	(60,00,000)	1	(60,00,000)
3	Dividend Inflow)	11,10,000	0.9704 $[1 \div e^{0.12 \times 3/12}]$	10,77,144	0.9706 $[1 \div 1.012^3]$	10,77,366

12	Sale (Inflow)	55,50,000	0.8869 [$1 \div e^{0.12 \times 12/12}$]	49,22,295	0.8874 [$1 \div 1.012^{12}$]	49,25,070
	Net Present Value			(561)		2,436

Conclusion: If Pranab follows monthly discounting option, he will buy the shares of Vignette Accessories Ltd.

Note: No. of share = $60,00,000/200 = 30,000$ Shares.

Illustration 5.

Theoretical Forward Price — No Dividends, No Carrying Cost Compute the theoretical forward price of the following securities for 1 month, 3 months and 6 months —

Securities of	DD Ltd.	EE Ltd.	FF Ltd.
Spot Price [S_0]	₹160	₹ 2,600	₹ 600

You may assume a risk free interest rate of 9% p.a and 12% p.a.

Solution:

1. Theoretical Forward Price

Theoretical Forward Price of Security X [F_x] = $S_x \times e^{rt}$

Where, S_x = Current Spot Price of Security X

r = Rate of Interest

t = Period in Years

2. Forward Price of Securities of the Companies

(a) DD Ltd.

Period (t)	$r = 9\% \text{ p.a. or } 0.09$	$r = 12\% \text{ p.a. or } 0.12$
1 Month or 1/12 Year i.e. 0.0833	$F_A = ₹160 \times e^{0.09 \times 0.0833}$ $= ₹160 \times e^{0.0075}$ $= ₹160 \times 1.007528$ $= ₹161.20$	$F_A = ₹160 \times e^{0.12 \times 0.0833}$ $= ₹160 \times e^{0.01}$ $= ₹160 \times 1.01005$ $= ₹161.608$
3 Months or 3/12 Year i.e. 0.25	$F_A = ₹160 \times e^{0.09 \times 0.25}$ $= ₹160 \times e^{0.0225}$ $= ₹160 \times 1.022755$ $= ₹163.641$	$F_A = ₹160 \times e^{0.12 \times 0.25}$ $= ₹160 \times e^{0.03}$ $= ₹160 \times 1.030456$ $= ₹164.873$
6 Months or 6/12 i.e. 0.50	$F_A = ₹160 \times e^{0.09 \times 0.50}$ $= ₹160 \times e^{0.045}$ $= ₹160 \times 1.046028$ $= ₹167.3645$	$F_A = ₹160 \times e^{0.12 \times 0.50}$ $= ₹160 \times e^{0.06}$ $= ₹160 \times 1.061837$ $= ₹169.8939$

(b) EE Ltd.

Period (t)	$r = 9\% \text{ p.a. or } 0.09$	$r = 12\% \text{ p.a. or } 0.12$
1 Month or 1/12 Year i.e. 0.0833	$F_A = ₹2,600 \times e^{0.09 \times 0.0833}$ $= ₹2,600 \times e^{0.0075}$ $= ₹2,600 \times 1.007528$ $= ₹2,619.573$	$F_A = ₹2,600 \times e^{0.12 \times 0.0833}$ $= ₹2,600 \times e^{0.01}$ $= ₹2,600 \times 1.01005$ $= ₹2,626.13$



3 Months or 3/12 Year i.e. 0.25	$F_A = ₹2,600 \times e^{0.09 \times 0.25}$ $= ₹2,600 \times e^{0.0225}$ $= ₹2,600 \times 1.022755$ $= ₹2,659.163$	$F_A = ₹2600 \times e^{0.12 \times 0.25}$ $= ₹2600 \times e^{0.03}$ $= ₹2600 \times 1.030456$ $= ₹2,679.186$
6 Months or 6/12 i.e. 0.50	$F_A = ₹2,600 \times e^{0.09 \times 0.50}$ $= ₹2,600 \times e^{0.045}$ $= ₹2,600 \times 1.046028$ $= ₹2,719.673$	$F_A = ₹2,600 \times e^{0.12 \times 0.50}$ $= ₹2,600 \times e^{0.06}$ $= ₹2,600 \times 1.061837$ $= ₹2,760.776$

(c) FF Ltd.

Period (t)	r = 9% p.a. or 0.09	r = 12% p.a. or 0.12
1 Month or 1/12 Year i.e. 0.0833	$F_A = ₹600 \times e^{0.09 \times 0.0833}$ $= ₹600 \times e^{0.0075}$ $= ₹600 \times 1.007528$ $= ₹604.517$	$F_A = ₹600 \times e^{0.12 \times 0.0833}$ $= ₹600 \times e^{0.01}$ $= ₹600 \times 1.01005$ $= ₹606.03$
3 Months or 3/12 Year i.e. 0.25	$F_A = ₹600 \times e^{0.09 \times 0.25}$ $= ₹600 \times e^{0.0225}$ $= ₹600 \times 1.022755$ $= ₹613.653$	$F_A = ₹600 \times e^{0.12 \times 0.25}$ $= ₹600 \times e^{0.03}$ $= ₹600 \times 1.030456$ $= ₹618.274$
6 Months or 6/12 i.e. 0.50	$F_A = ₹600 \times e^{0.09 \times 0.50}$ $= ₹600 \times e^{0.045}$ $= ₹600 \times 1.046028$ $= ₹627.617$	$F_A = ₹600 \times e^{0.12 \times 0.50}$ $= ₹600 \times e^{0.06}$ $= ₹600 \times 1.061837$ $= ₹637.102$

Illustration 6.

Shares of Sandeep Ltd are being quoted at ₹600 . 3-Months Futures Contract Rate is ₹636 per share for a lot size of 500 shares. If the Sandeep Ltd is not expected to distribute any dividend in the interim, risk free rate of return is 9%, what is the recommended course of action for a trader in shares?

If the 3-Months Futures Contract Rate is ₹ 600, what should be the action?

Solution:

1. Computation of Theoretical Forward Rate [TFP]

Particulars	Value
Spot Price [S_x]	₹600
Risk Free Interest Rate [r]	9% or 0.09
Period [t]	3 Mths or 3/12 Yrs i.e. 0.25
Theoretical Forward Rate [TFP_x] = $S_x \times e^{rt} = ₹600 \times e^{0.09 \times 0.25}$ = $₹600 \times e^{0.0225} = ₹600 \times 1.02276$	₹613.656

2. Evaluation and Suggested Course of Action

Particulars	Case A	Case B
3-Months Futures Contract Rate [AFP_x]	₹636	₹600
TFP_x Vs. AFP_x	AFP_x is Higher	AFP_x is Lower
Valuation in Futures Market	Overvalued	Undervalued
Action	Buy Spot. Sell Future.	Sell Spot. Buy Future.

Illustration 7.

Compute the theoretical forward price of the following securities for 1 month, 3 months and 6 months —

Securities of	A Ltd.	B Ltd.	D Ltd.
Spot Price [S_0]	₹4,550	₹360	₹900
Dividend Expected	₹50	₹20	₹50
Dividend Receivable in	2 Months	3 Months	4 Months
6 Month's Futures Contract Rate	₹4600	₹390	₹920

You may assume a risk free interest rate of 9% p.a.

What action should follow to benefit from futures contract?

Solution:

Securities of	A Ltd.	B Ltd.	D Ltd.
Spot Price [S_x]	₹4,550	₹360	₹900
Dividend Expected [D_e]	₹50	₹20	₹50
Dividend Receivable in [t]	2 Months or 1/6 Year or 0.1667	3 Months or Year or 0.25	4 Months or 1/3 year or 0.333
Risk Free Interest Rate [r]	9% or 0.09	9% or 0.09	9% or 0.09
Present Value of Dividend [D_p]	$DF \times e^{-rt}$ or $DF \div e^{rt}$ $= ₹50 \div e^{0.09 \times 0.1667}$ $= ₹50 \div e^{0.015}$ $= ₹50 \div 1.01511$ $= ₹49.256$	$DF \times e^{-rt}$ or $DF \div e^{rt}$ $= ₹20 \div e^{0.09 \times 0.25}$ $= ₹20 \div e^{0.0225}$ $= ₹20 \div 1.022755$ $= ₹19.555$	$DF \times e^{-rt}$ or $DF \div e^{rt}$ $= ₹50 \div e^{0.09 \times 0.3333}$ $= ₹50 \div e^{0.03}$ $= ₹50 \div 1.030455$ $= ₹48.522$
Adjusted Spot Price [S_{Adj}] = $S_x - D_p$	$₹4550 - ₹49.256$ $= ₹4500.744$	$₹360 - ₹19.555$ $= ₹340.445$	$₹900 - ₹48.522$ $= ₹851.478$
Theoretical Forward Price [TFP $_x$]	$= 4500.744 \times e^{0.09 \times 0.50}$ $= 4500.744 \times e^{0.045}$ $= 4500.744 \times 1.04603$ $= ₹4704.91$	$= 340.445 \times e^{0.09 \times 0.50}$ $= 340.445 \times e^{0.045}$ $= 340.445 \times 1.04603$ $= ₹356.312$	$= 851.478 \times e^{0.09 \times 0.50}$ $= 851.478 \times e^{0.045}$ $= 851.478 \times 1.04603$ $= ₹890.672$
6 Months Futures Contract Rate [AFP $_x$]	₹4600	₹390	₹900
TFP $_x$ Vs. AFP $_x$	AFP $_x$ is Lower	AFP $_x$ is Higher	AFP $_x$ is Higher
Valuation in Futures Market	Undervalued	Overvalued	Overvalued
Recommended Action	Sell Spot. Buy Future.	Buy Spot. Sell Future.	Buy Spot. Sell Future.

Illustration 8.

Compute the theoretical forward price of the following securities —

Securities of	R Ltd.	S Ltd.
Current Market Price i.e. Spot Price [S_0]	₹1,300	₹600
Dividend Expected	2%	16%
3-Month's Futures Contract Rate	₹1,360	₹580



You may assume a risk free interest rate of 10% p.a. What action should follow to benefit from futures contract?

Solution:

Securities of	R Ltd.	S Ltd.
Spot Price [S_x]	₹1,300	₹ 600
Dividend Yield Expected [y]	2% or 0.02	16% or 0.16
Tenor/Time Period [t] in Years	3 Months or 0.25 Year	3 Months or 0.25 Year
Risk Free Interest Rate [r]	10% or 0.10	10% or 0.10
Theoretical Forward Price [TFP_x] $TFP_x = S_x \times e^{(r-y) \times t}$	$= ₹1,300 \times e^{(0.10 - 0.02) \times 0.25}$ $= ₹1,300 \times e^{0.08 \times 0.25}$ $= ₹1,300 \times e^{0.02}$ $= ₹1,300 \times 1.0202$ $= ₹1,326.26$	$= ₹600 \times e^{(0.10 - 0.16) \times 0.25}$ $= ₹600 \times e^{-0.06 \times 0.25}$ $= ₹600 \times e^{-0.015}$ $= ₹600 \div e^{0.015}$ $= ₹600 \div 1.015113 = ₹591.07$
3-Months Futures Contract Rate [AFP_x]	₹1360	₹580
TFP_x Vs. AFP_x	AFP_x is Higher	AFP_x is Lower
Valuation in Futures Market	Overvalued	Undervalued
Recommended Action	Buy Spot. Sell Future.	Buy Future. Sell Spot.

Illustration 9.

A four month European call option on a dividend paying stock is currently selling for ₹5. The stock price is ₹66, the strike price is ₹60, and a dividend of ₹0.80 is expected in one month. The risk free interest rate is 12% per annum for all maturities. Do you have arbitrage?

Solution:

Particulars	Amount
Spot Price [S_x]	₹66
Dividend Expected [D_F]	₹0.80
Dividend Receivable in [t]	1 Month or 1/12 Year or 0.0833
Risk Free Interest Rate [r]	12% or 0.12
Present Value of Dividend [D_P]	$D_F \times e^{-rt}$ or $D_F \div e^{rt}$ $= ₹0.80 \div e^{0.12 \times 1/12}$ $= ₹0.80 \div e^{0.01}$ $= ₹0.80 \div 1.01005 = ₹0.7920$
Adjusted Spot Price [S_{Adj}] = $S_x - D_P$	₹66 - ₹0.7920 = ₹64.208
Theoretical Forward Price [TFP_x] = $S_{Adj} \times e^{rt}$	$= 64.208 \times e^{0.12 \times 4/12}$ $= 64.208 \times e^{0.04}$ $= 64.208 \times 1.0408 = ₹67.868$

Conclusion: Since the Theoretical Forward Price is different from the Stock Price, Arbitrage exists.

Illustration 10.

The following data relate to JB Ltd.'s share Price:

- Current Price Per Share - ₹1,820; 2.6 months' Futures price per share - ₹2,028.
- Assuming it is possible borrow money in the market for transactions in securities at 12% per annum, you are required - to calculate the theoretical minimum price of a 6 months forward purchase; and to explain arbitrating opportunity.

Solution:**1. Computation of Theoretical Futures Price**

Securities of	Infosys
Spot Price [S_x]	1,820
Required Rate of Return	12%
Tenor / Time Period [t] in Years	6 Months or 0.50 Year
Theoretical Forward Price [TFP _x] $TFP_x = AS_x \times e^{(r-y) \times t}$	$= ₹ 1,820 \times e^{0.2 \times 0.50}$ $= ₹ 1,820 \times e^{0.06}$ $= ₹ 1,820 \times 1.0618 = ₹ 1,932.476 e^{0.2 \times 0.50}$
3-Months Futures Contract Rate [AFP _x]	₹2,028
TFP _x Vs. AFP _x	AFP _x is Higher
Inference	AFP _x is overvalued
Recommended Action	Buy Spot. Sell Future.

2. Cash Flows and Activity Flow for Arbitrage Advantage

- Borrow ₹1,820 for a period of 6 months at the rate of 12% p.a.
- Buy the Stock at ₹ 1,820 at T_0
- Receive the Dividend at the time of 6 months [$₹10 \times 30\% = ₹3$].
- Sell the stock in the Futures Market at the Forward Price at the end of 6 months [₹2,028].
- Repay the amount of Loan with Interest at the end of the period at ₹1,932.476.
- Riskless Profit = **₹95.524**.

Illustration 11.

The price of Compact Stock of a face value of ₹10 on 31st December, 2012 was ₹414 and the futures price on the same stock on the same date i.e., 31st December, 2012 for March, 2013 was ₹444.

Other features of the contract and the related information are as follows:

- Time to expiration 3 months (0.25 year)
- Annual dividend on the stock of 30% payable before 31.3.2012.
- Borrowing Rate is 20 % p.a.

Based on the above information, calculate future price for compact stock on 31st December, 2012. Please also explain whether any arbitrage opportunity exists.

Solution:

Securities of	Compact
Spot Price [S_x]	₹414
Expected rate of Dividend [y]	30% or 0.30
Borrowing Rate	20%
Tenor / Time Period [t] in Years	3 Months or 0.25 Year
Present Value of Dividend	$= 30\% \times 10 \times e^{-0.20 \times 0.25}$ $= 30\% \times 10 \div 1.05127 = 2.8537$



Adjusted Spot Price [Spot Price- Present Value of Dividend] [AS _x]	= 414 - 2.8537 = ₹411.1463
Theoretical Forward Price [TFP _x] $TFP_x = AS_x \times e^{(r-y)xt}$	$= ₹411.1463 \times e^{0.20 \times 0.25}$ $= ₹411.1463 \times e^{0.05}$ $= ₹411.1463 \times 1.05127 = ₹432.23$
3-Months Futures Contract Rate [AFP _x]	₹ 444
TFP _x Vs. AFP _x	AFP _x is Higher
Inference	AFP _x is overvalued
Recommended Action	Buy Spot. Sell Future.

2. Cash Flows to Gain on the Arbitrage Opportunity

Activity Flow:

- Borrow ₹414 for a period of 3 months at the rate of 20% p.a.
- Buy the Stock at ₹414 at T₀
- Receive the Dividend at the time of 3 months [₹10 X 30% = ₹3].
- Sell the Index Futures at the Forward Price at the end of 3 months [₹444].
- Repay the amount of Loan with Interest at the end of the period.

Cash Flows arising out of the Activities to gain on the Arbitrage.

Sl. No.	Particulars	₹
(a)	Borrow for a period of 3 months and Buy Stock at T ₀	₹ 414
(b)	Receive the Dividend at the end of 3 months	3
(c)	Sell the Futures at the Forward Price at the end of 3 months	444
(d)	Repay the amount of borrowing together with Interest = [414(1+0.20x0.25)]	(434.7)
(e)	Net Cash Inflow [(c)-(d)]	9.3

Illustration 12.

Super Polycarbons Ltd. has the following information about LDPE and HDPE Granules (raw material used for Manufacturing Plastic Films, Polyfilms and Plastic Sheets –

Stock Item	LDPE Granules	HDPE Granules
Current Market Price i.e. Spot Price [So]	₹75 per kg	₹85 per kg
Carrying Cost	4% p.a. [continuous compounding]	₹100 per Quintal per quarter (payable after 2 months)
3-Month's Futures Contract Rate (500 Kgs)	₹38,500	₹44,600

Risk free interest rate is at 12% p.a. Advise Sundary Polycarbons on the course of action to be taken?

Solution:**1. Evaluation of Futures Contract Option for LDPE Granules**

Inventory / Commodity	LDPE Granules
Spot Price [S_x]	₹75 per kg
Storage Costs [rate] [c]	4% or 0.04
Tenor / Time Period [t] in Years	3 Months or 0.25 Year
Risk Free Interest Rate [r]	12% or 0.12
Theoretical Forward Price [TFP_x] per kg $TFP_x = S_x \times e^{(r+c) \times t}$ $= ₹75 \times e^{(0.12 + 0.04) \times 0.25}$ $= ₹75 \times e^{0.16 \times 0.25} = ₹75 \times e^{0.04} = ₹75 \times 1.0408$	₹78.061
TFP_x per lot size of 500 kg [500 Kgs X ₹78.06 per kg]	₹39,030
3-Months Futures Contract Rate [AFP_x]	₹38,500
TFP_x Vs. AFP_x	AFP_x is Lower
Valuation in Futures Market	Undervalued
Recommended Action	Buy Future. Sell Spot.

2. Evaluation of Futures Contract Option for HDPE Granules

Inventory / Commodity	LDPE Granules
Spot Price [S_x]	₹85 per kg or ₹42,500 per Lot of 500 Kgs
Storage Costs [rate] [C] (payable after 2 months)	₹100 per Quintal (i.e. 100 kgs) per quarter or ₹500 per lot of 500 Kgs
Tenor / Time Period [t] in Years	2 Months or 0.1667 Year
Risk Free Interest Rate [r]	12% or 0.12
Present Value of Storage Costs [C_p] $C_F = e^{-rt}$ or $C_F \div e^{rt}$ $= ₹500 \div e^{0.12 \times 0.16667} = ₹500 \div e^{0.02} = ₹500 \div 1.0202$	₹490.10
Adjusted Current Spot Price of HDPE Granules S_{Adj} [Spot Price ₹42,500 + Present Value of Storage Costs C_p ₹490.10]	₹42,990.10
Theoretical Forward Price [TFP_x] per kg $TFP_x = S_{Adj} \times e^{rt}$ $= ₹42,990.10 \times e^{0.12 \times 0.25}$ $= ₹42,990.10 \times e^{0.03} = ₹42,990.10 \times 1.03045$	₹44,299.15
3-Months Futures Contract Rate [AFP_x]	₹44,600
TFP_x Vs. AFP_x	AFP_x is Higher
Valuation in Futures Market	Overvalued
Recommended Action	Buy Spot. Sell Future.

**Illustration 13.**

The following data relates to DCB Ltd's share prices:

Current price per share	₹170
Price per share in the futures market - 6 months	₹190

It is possible to borrow money in the market for securities transactions at the rate of 12 % p.a.

Required—

- Calculate the theoretical minimum price of 6 month-futures contract.
- Explain if any arbitraging opportunities exist.

Solution:

1. Theoretical Futures Price

Particulars	Value
6-months Futures Price	₹190
Current Stock Price [S_x]	₹170
Borrowing Rate (r)	12% or 0.12
Time (in years)	6/12 = 0.5 year
Theoretical Futures Price [F_x]	$= S_x \times e^{rt}$ $= ₹170 \times e^{0.12 \times 0.5}$ $= ₹170 \times e^{0.06}$ $= ₹170 \times 1.06184$ $= ₹180.513$

Inference: Since the Theoretical Futures Price is less than the Expected Futures Price, the recommended action would be to sell in the Futures Market.

2. Cash Flows to gain from Arbitrage Opportunity Activity Flow:

- Arbitrageur can borrow the amount required to buy the Shares at the current Market Price i.e. ₹170 at the rate of 12% p.a. for 6 months.
 - Enter into a Futures Contract to sell Shares at the rate of ₹190.
 - On the expiry date, sell the shares at the 6-month Futures rate of ₹190.
 - Pay the amount of Borrowing together with Interest i.e. $[170 \times e^{0.12 \times 0.5}]$ ₹180.513.

Particulars	Time	₹
1. Borrow at the rate of 12% for 6 months	T_0	170
2. Enter into a Futures Contract to sell Shares.	T_0	-
3. On the Expiry Date, sell the shares at 6-month Forward Rate.	T_1	190
4. Repay the amount of Borrowing together with Interest $[170 \times e^{0.12 \times 0.5}] = [170 \times 1.06184]$	T_1	180.513
5. Net Gain made [(3) - (4)]	T_1	9.487

Illustration 14.

Anirbav Packaging and Lables (APL) manufactures and supplies printed polyfilms and sachets to its clients. The spot price of 60 Microns Polyfilm Rolls is ₹120 per kg. The 6-month futures price is ₹1,32,500 per tonne. If the bimonthly storage cost is ₹2,500 per tonne, payable in advance and the relevant interest rate is 12%, ascertain return (savings as a percentage) earned by APL by carrying inventory of 1 tonne,

What will be the answer if the storage cost is ₹6000 payable in advance? Assume Futures Price is fairly priced.

Solution:**1. Computation of Factors**

Particulars	Value
Risk Free Interest Rate [r]	12% or 0.12
Spot Price [S_x]	₹120 per kg or ₹1,20,000 per tonne
Storage Costs [C] (payable at the beginning of every 2 months)	₹2500 per tonne
Period in Years [t]	6 Months or 0.50 Years
6-Months Futures Price	₹ 1,32,500
Present Value of Storage Costs [C_p] [See Note]	₹7,353
Adjusted Spot Price [S_{Adj}] [$S_x + C_p$] = ₹1,20,000 + ₹7,353	₹ 1,27,353
Yield Expected [Savings] [y]	To be ascertained

Note: Present Value of Storage Costs

Particulars	1 st Installment	2 nd Installment	3 rd Installment
Amount Payable [C_F]	₹2,500	₹2,500	₹2,500
Time Period in Years, within which payable [t]	Immediate i.e. 0 Years	2 Months later i.e. 0.16667 Year	4 Months later i.e. 0.3333 Year
Present Value [C_p] = $C_F \times e^{-rt}$ or $C_F \div e^{rt}$	$2,500 \div e^{0.12 \times 0}$ $= ₹2,500 \div e^0$ $= ₹2,500 \div 1$ $= ₹2,500$	$2,500 \div e^{0.12 \times 0.16667}$ $= ₹2,500 \div e^{0.02}$ $= ₹2,500 + 1.0202 =$ $₹2,450.50$	$2,500 \div e^{0.12 \times 0.3333}$ $= ₹2,500 \div e^{0.04}$ $= ₹2,500 \div 1.0408$ $= ₹2,402$

Present Value of Storage Costs = ₹2,500 + ₹2,450.50 + ₹2,402 = **₹7,352.50 or ₹7,353**

2. Computation of Yield (in %) — Storage Costs Payable Bimonthly

Formula: Theoretical Forward Price [TFP_x] when yield in % is known —

$$TFP_x = S_{Adj} \times e^{(r-y)xt}$$

Proposition: 6-Months Future Price is fairly priced

$$\Rightarrow AFP_x = TFP_x$$

$$\Rightarrow AFP_x = S_{Adj} \times e^{(r-y)xt}$$

$$\Rightarrow ₹1,32,500 = ₹1,27,353 \times e^{(0.12 - y) \times 0.50}$$

$$\Rightarrow e^{(0.12 - y) \times 0.50} = ₹1,32,500 \div ₹1,27,353$$

$$\Rightarrow e^{(0.12 - y) \times 0.50} = 1.0483$$



$$\Rightarrow \ln 1.0483 = (0.12 - y) \times 0.50$$

$$\Rightarrow 0.03961 = (0.12 - y) \times 0.50$$

$$\Rightarrow 0.12 - y = 0.03961 \div 0.50$$

$$\Rightarrow 0.12 - y = 0.07922$$

$$\Rightarrow y = 0.12 - 0.07922$$

$$\Rightarrow y = 0.04078$$

$$\Rightarrow y = 4.078\%$$

3. Computation of Yield (in %) — Storage Costs ₹ 6,000 Payable in Advance

Adjusted Spot Price [S_{Adj}] = Spot Price of ₹ 1,20,000 + Storage Cost of ₹ 6,000
= ₹ 1,26,000

$$\Rightarrow AFP_x = TFP_x$$

$$\Rightarrow AFP_x = S_{Adj} \times e^{(r-y) \times t}$$

$$\Rightarrow ₹ 1,32,500 = ₹ 1,27,500 \times e^{(0.12 - y) \times 0.50}$$

$$\Rightarrow e^{(0.12 - y) \times 0.50} = ₹ 1,32,500 \div ₹ 1,26,000$$

$$\Rightarrow e^{(0.12 - y) \times 0.50} = 1.05158$$

$$\Rightarrow \ln 1.05158 = (0.12 - y) \times 0.50$$

$$\Rightarrow 0.05029 = (0.12 - y) \times 0.50$$

$$\Rightarrow 0.12 - y = 0.05029 \div 0.50$$

$$\Rightarrow 0.12 - y = 0.10058$$

$$\Rightarrow y = 0.12 - 0.10058$$

$$\Rightarrow y = 0.01942 \text{ or } 1.94\%$$

Illustration 15.

Given the following information—

BSE Index 50,000

Value of Portfolio ₹ 1,01,00,000

Risk Free Interest Rate 9% p.a.

Dividend Yield on Index 6% p.a.

Beta of Portfolio 2.0

We assume that a futures contract on the BSE index with 4 months maturity is used to hedge the value of portfolio over next 3 months. One future contract is for delivery of times the index. Based on the information, Calculate — (a) Price of future contract, (b) The gain on short futures position if index turns out to be 45,000 in 3 months.

Solution:**1. Computation of Price of Futures Contract**

Securities of	R Ltd.
Spot Price [S_x]	₹50,000
Dividend Yield Expected [y]	6% or 0.06
Tenor / Time Period [t] in Years	4 Months or 0.3333 Year
Risk Free Interest Rate [r]	9% or 0.09
Price of Futures Contract [TFP_x] $TFP_x = S_x \times e^{(r-y) \times t}$	$= ₹ 50,000 \times e^{(0.09 - 0.06) \times 0.3333}$ $= ₹ 50,000 \times e^{0.03 \times 0.3333}$ $= ₹ 50,000 \times e^{0.01} = ₹ 50,000 \times 1.0101 = ₹ 50,505$

Therefore, price of the Futures Contract is ₹ 50,505 or ₹ 50,500 (Approx)

2. Gain on Short Futures Position**(a) Computation of No. of Contracts to be entered into:**

Particulars	Value
Portfolio Value	₹ 101,00,000
4-Month's Futures Price per Unit of BSE Index	₹ 50,500
No. of Units per BSE Index Futures Contract	50
Value per BSE Index Futures Contract [50 Units X ₹50,500 per Unit]	₹ 25,25,000
No. of Contract to be entered [Portfolio Value X Beta of Portfolio w.r.t Index ÷ Value per BSE Index Futures Contract] = [₹101,00,000 X 2.0 ÷ ₹25,25,000]	8 Contracts

(b) Computation of Gain on Short Futures Position

Particulars	Value
Position	SELL
Contracted Sale Price per Unit of BSE Index	₹ 50,500
Less: Index Position in 3-Months	₹ 45,000
Gain per Unit of BSE Index Future	₹ 5,500
No. of Units per Contract	50
Gain per Contract [₹5,500 X 50 Units]	₹ 2,75,000
No. of Contract entered into	6
Total Gain [8 Contracts X ₹2,75,000 per Contract]	22,00,000

Total Gain on Short Futures Position in 3 Months is ₹ 22,00,000.

Illustration 16.

Fashion Ltd. manufactures cruiser bikes for export to Americana and Europe. It requires a special type alloy called "Fecal", made up of Iron, Aluminum and Copper. Fecal is sold at ₹230 per kg in the spot market. If Fashion Ltd. has a requirement of 6 tonnes in 6 months time, and the 6-Months Future Contract rate is ₹2.40 Lakhs per tonne. Carrying cost is 5% p.a. If the interest rate is 10%, should the Company opt for Futures Contract?

Case A: If the Company does opt for Futures Contract for buying 6 Tonnes of Fecal, what will be the effect if —

- (a) Spot Rate at the end of 6 months is ₹2,55,000 per tonne?
- (b) Spot Rate at the end of 6 months is ₹2,35,000 per tonne?



Has the Company gained or lost? If the Company has lost, is it proper to conclude that Futures Contract has failed to save the company from loss, and therefore need not be resorted to?

Case B: What will be the course of action and effect of such action in the above two cases, if —

- There is no Futures Market for Fecal;
- Hedge ratio for Fecal with the Metal Index is 0.9 i.e. Beta of Fecal with Metal Index is 0.90 (i.e. beta for change in values)
- Each Metal Index contract is equivalent to 500 Kgs of Fecal.
- 6-Months' Metal Index Future is 4800 points. [Assume futures contract are divisible]

If in Case A, Fashion Ltd. wants to cash in on an arbitrage opportunity, what should it do?

Solution:

1. Computation of Theoretical Forward Price [TFP_x]

$$FP_x = S_x \times e^{(r+c) \times t}$$

Where, S_x = Current Spot Price = ₹230 per kg or ₹2,30,000 per tonne

r = Rate of Interest per annum = 10% p.a. or 0.10

c = Carrying cost (rate per annum) = 5% p.a. or 0.05

t = Period of Futures Contract in Years = 6 Months or 0.50 Years

$$TFP_x = ₹2,30,000 \times e^{(0.10 + 0.05) \times 0.50}$$

$$= ₹2,30,000 \times e^{0.15 \times 0.50}$$

$$= ₹2,30,000 \times e^{0.075}$$

$$= ₹2,30,000 \times 1.0779$$

$$= ₹2,47,917$$

2. Evaluation of Futures Contract Proposal

- Theoretical Futures Price ₹2,47,917 is greater than Actual Futures Price ₹2,42,000.
- Therefore, the Company should go in for futures for buying 6 Tonnes of Fecal.
- Theoretically the Company stands to gain ₹5,917 per tonne based on Theoretical Futures Price.
- Company can freeze its loss (based on current spot price of ₹2.30 Lakhs per tonne) to ₹10,000 per tonne.

3. Effect of Futures Contract Proposal — Based on Actual Spot Rate 6-Months Later

Particulars	Situation A	Situation B
Spot Rate (6-Months later) is (per tonne)	₹2.55 Lakhs	₹2.35 Lakhs
Actual Futures Price is (per tonne)	₹2.42 Lakhs	₹2.42 Lakhs
6—Months' Future Price vs. Spot Rate [S_1]	AFP is lower.	AFP is higher.
Based on Actual Spot Rate on the date of exercise (i.e. 6 Months later), buying 6 tonnes at ₹2.42 Lakhs per tonne	Gain of ₹ 13,000 per tonne.	Loss of ₹7,000 per tonne

Conclusion:

- Futures contract **does not eliminate loss**. It **only eliminates uncertainty** associated with price. It is only a guarantee that the contractee will not gain or lose beyond a particular level (level determined by the Future Price) with reference to the current spot price.
- As a hedging tool, it freezes (fixes) the price and thereby mitigates the risk associated with price. The maximum gain or loss is known the day on which futures contract is entered into. One need not wait for the actual delivery or exercise day to know the rate.
- Therefore, it is inappropriate to conclude that Futures Contract should not be resorted to since it has failed to save the Company from loss.

4. No Future Rate Available**(a) Basis and Suggested Course of Action**

- Since Fecal is not traded in the Futures Market, Fashion Ltd. can resort to **Cross Hedge** i.e. entering into a Futures Contract in a related index/commodity (whose prices move in tandem with Fecal).
- Since the Metal Index moves in tandem with the price of Fecal, Fashion Ltd. should enter into a Futures Contract in Metal Index opposite to its position in Fecal's Cash Market i.e. it requires 6 Tonnes of Fecal six months hence (Going Long), therefore, it should sell 6-Months Future Contract for Metal Index (Going Short).
- **Course of Action:** Sell Metal Index Futures. Buy Fecal Stock in Cash Market (to be executed Six Months hence).

(b) Activity Flow

Activity	Time	Description
Contract	Now	Enter into 6-Months' Futures Contract for Selling 10.80 Metal Index Futures
Settle Futures Contract	6-Months Later	Settle 6-Month's Future Metal Index liability by pocketing (gain) or paying (loss) the price difference. Gain (₹) = No. of Contracts X No. of Fecal Units per Contract X Gain in Metal Index Points Loss (₹) = No. of Contracts X No. of Fecal Units per Contract X Loss in Metal Index Points
Buy	6-Months Later	Buy Six Tonnes at prevailing spot price. [Prevailing Spot Price = Spot Price at the beginning of Futures Contract ± Gain/ Loss in settlement of Metal Index Futures]

Working Note: Contract Determination

Number of Metal Index Futures to be sold

$$= \text{Hedge Ratio} \times \frac{\text{Units of Spot Position requiring hedging}}{\text{No. of Units underlying one Futures Contract}}$$

$$\text{Hedge Ratio} [\text{Beta of changes in Price of Fecal w.r.t. metal Index}] \times \frac{\text{Quantity of Fecal required by Triumph}}{\text{Quantity of fecal equivalent of one Futures Contract of Metal Index}}$$

$$= 0.90 \times 6 \text{ Tonnes} \div 0.50 \text{ Tonne} = 0.90 \times 12 = 10.80 \text{ Futures Contracts}$$



(c) Cash Flow

Price in Spot Market 6- Months later is ₹2.55 Lakhs

Particulars	Value
Value per Kg six months later [$₹2,55,000 \div 1,000$ Kgs]	₹255
Less: Value per Kg at the beginning	₹230
Appreciation / (Depreciation) in Price per Kg. of Fecal	₹25
Hedge Ratio (i.e. Beta Value of movement in Fecal w.r.t to Metal Index Futures)	0.90
Appreciation in Metal Index [per metal index futures] [Appreciation in Fecal Price $\div$ Hedge Ratio] = $25 \div 0.90 = 27.778$ Points i.e. Metal Index would have appreciated by 27.778 points to 4,827.778 Points ($4,800 + 27.778$)	27.778 Points
Gain on Settlement of Metal Index Futures [No. of Contracts X No. of Fecal Units per Contract X Gain in Metal Index Points] = 10.80×500 Kgs. X ₹27.778 [This is the Cash Inflow for Triumph Ltd]	₹1,50,000
Cash Outflow => For Purchase of 6 Tonnes of Fecal ₹2.55 Lakhs per tonne X 6 Tonnes = ₹15,30,000 = Spot Price at the Beginning + Gain on Settlement of Metal Index Futures = ₹2,30,000 x 6 Tonnes + ₹1,50,000 = ₹13,80,000 + ₹1,50,000	₹15,30,000
Net Outflow for Fashion Ltd. = ₹15,30,000 - ₹1,50,000	₹13,80,000

Price in Spot Market 6-Months later is ₹2.35 Lakhs

Particulars	Value
Value per Kg six months later [$₹2,35,000 \div 1,000$ Kgs]	₹235
Less: Value per Kg at the beginning	₹230
Appreciation / (Depreciation) in Price per Kg. of Fecal	₹5
Hedge Ratio (i.e. Beta Value of movement in Fecal w.r.t to Metal Index Futures)	0.90
Appreciation in Metal Index [per metal index futures] = Appreciation in Fecal Price $\div$ Hedge Ratio = $5 \div 0.90 = 5.556$ Points i.e. Metal Index would have appreciated by 5.556 points to 4805.556 Points ($4800 + 5.556$)	5.556 Points
Gain on Settlement of Metal Index Futures [No. of Contracts X No. of Fecal Units per Contract X Gain in Metal Index Points] = 10.80×500 Kgs. X ₹5.556 [This is the Cash Inflow for Fashion Ltd.]	₹30,000
Cash Outflow => For Purchase of 6 Tonnes of Fecal ₹2.55 Lakhs per tonne X 6 Tonnes = ₹14,10,000 = Spot Price at the Beginning + Gain on Settlement of Metal Index Futures = ₹2,30,000 x 6 Tonnes + ₹30,000 = ₹13,80,000 + ₹30,000	₹14,10,000
Net Outflow for Fashion Ltd. = ₹14,10,000 - ₹30,000	₹13,80,000

5. Arbitrage Opportunity

- Position:** Theoretical Futures Price (₹2,47,917) $\neq$ Actual Futures Price (₹2,42,000)
- AFP vs. TFP:** To benefit from the opportunity, Fashion Ltd. should Buy Future and Sell Spot.
- Profit:** = Sale Value (Spot Price) **Less** Purchase Cost (Present Value of Future Price)
 $= [₹2,30,000 \times 6 \text{ Tonne}] \text{ Less } [₹2,42,000 \text{ per tonne} \times 6 \text{ Tonnes} \div e^r]$
 $= ₹13,80,000 \text{ Less } [₹14,52,000 \div e^{(0.10+0.05) \times 0.5}]$
 $= ₹13,80,000 \text{ Less } [₹14,52,000 \div e^{0.15 \times 0.5}]$

$$\begin{aligned}
&= ₹13,80,000 \text{ Less } [₹14,52,000 \div e^{0.075}] \\
&= ₹13,80,000 \text{ Less } [₹14,52,000 \div 1.07788] \\
&= ₹13,80,000 \text{ Less } ₹13,47,089 \\
&= ₹32,911.
\end{aligned}$$

Illustration 17.

Bharat Investments Ltd is long on 25,000 Shares of Trinayan Earthmoving Equipments Ltd (TEEL). Its shares are currently quoted at ₹180 per share. Bharat fears fall in prices of TEEL. It therefore wants to hedge its risk under the Futures Contract route. However, future rate is not available for TEEL. Therefore, Bharat is looking for cross hedge and the following particulars are made available –

Related Index	NIFTY	Infrastructure Index	Iron and Steel Index	Bank Index
Beta of TEEL with Related Index	0.8	1.1	1.3	1.0
Correlation of TEEL with Related Index	0.6	0.8	0.6	0.3
No. of Units of TEEL underlying every Futures Contract of Index	1000	500	1000	1250

Bharat contemplating taking a cross hedge in either Iron and Steel Index, because it has the highest Beta value, consequently requiring less no. of Futures Contract, or Bank Index as it has the perfect Beta Value.

Advise Bharat.

Solution:**1. Choice of Index for Cross Hedge****(a) Basis / Reasoning:**

- **Object of Hedging:** Hedging through Futures Contract is done to mitigate or eliminate price related risks. The object is to eliminate uncertainty about the future price movements and freeze the impact of price movement at a particular point.
- **Relevance of Beta Value:**
 - (i) Beta value is the sensitivity of the stock to be hedged (TEEL) to the changes in value of the indices. It is an indication of volatility of the stock with reference to the movement in index.
 - (ii) It is also equal to the number of units of Index Future required to hedge one unit of the stock.
 - (iii) High Beta or Low Beta value is not the sole factor determining the choice of a cross hedge. If however, transaction costs are high, and a low beta index may be preferred.
- **Correlation:** Choice of the perfect cross hedge should be based on the correlation between the price of the stock to be hedged and the index used as a cross hedge. Higher the correlation with the index, better the index for cross hedging.
- **Beta vs. Correlation:**
 - (i) An Index which is highly correlated with the stock to be hedged should be preferred over an index with a lower correlation.
 - (ii) Where two indexes carry the same Beta Index, one with the higher correlation should be preferred.



(iii) Where two index carry the same correlation, index with a lower Beta may be preferred.

(b) Evaluation of Different Indices

Related Index [I]	NIFTY	Infrastructure Index	Iron and Steel Index	Bank Index
Beta of TEEL [β_{MI}]	0.8	1.1	1.3	1.0
Correlation of TEEL [ρ_{MI}]	0.6	0.8	0.6	0.3
No. of Units of MEEL underlying every Futures Contract of Index	1000	500	1000	1250
Ranking based on Correlation [Most correlated Index]	2	1	3	4

Note: NIFTY vs. Iron and Steel Index: Though both have the same correlation, Beta w.r.t. NIFTY is nearer to 1 than beta w.r.t. to Iron and Steel Index. Therefore, NIFTY edges over Iron and Steel Index.

Conclusion: Therefore, Pritvi Investments should prefer to cross hedge using Infrastructure Index.

2. Course of Action

- Basis:** Pritvi is long in the cash market i.e. buy in the cash market. Therefore, it should take the opposite position in the Futures Market of Infrastructure Index.
- Activity:** It should sell Infrastructure Index Futures. Therefore it should enter into Futures Contract for selling Infrastructure Index Futures after a specified period.
- No. of Contracts:** No. of Infrastructure Contracts to be sold

$$= \text{Hedge Ratio} \times \frac{\text{Units of Spot Position requiring hedging}}{\text{Units in one Futures Contract of Infra Index}}$$

$$= \frac{\text{Hedge Ratio [Beta of changes in Price of Fecal w.r.t. metal Index]} \times \text{Units of TEEL required by Trinayan}}{\text{Units in one Future Contract of Infra Index}}$$

$$= 1.10 \times 25000 \text{ Units} \div 1000 \text{ Units}$$

$$= 1.10 \times 25 = 27.5 \text{ Futures Contracts}$$

Bharat should sell 27.5 Infrastructure Index Futures.

Illustration 18.

Emilee Trading Company has a beta of 0.80 with BSE 200. Each BSE 200 Futures contract is worth 100 units. Ranbir anticipates a bearish market for the next three months and has gone short on shares of 25,000 Shares of ETC in the spot market. ETC Shares are traded at ₹100.3-Months' Future BSE 200 is quoted at 12,500.

Required —

- No. of BSE 200 Futures Contract to be taken by Ranbir if he wants to hedge price risk to the extent of — (a) 60%, (b) 100%, (c) 125%.
- If price of ETC falls or increases by 20% in the spot market, how is Ranbir protected in the above three cases?
- If price of ETC falls by 30% in the spot market and BSE 200 is quoted at 12,000 on the same day, what is Ranbir's position in Case 1(b) above? What is the inference drawn in this case with reference to cross hedging?

Solution:

Course of Action: Ranbir is short in the Spot Market, therefore he should go long in the Futures Market i.e. Buy BSE 500 Futures. Sell Spot (already sold). Buy Future.

1. Computation of No. of Contracts to be taken

Factors: Hedge Ratio (Beta of ETC w.r.t. BSE 200) 0.80

Units of Spot Position to be hedged 25,000 Shares of ETC

Units per BSE 500 Futures Contract 100 Units

BSE 200 Futures Contracts for 100% Coverage **200** [$0.80 \times 25,000 \text{ Shares} \div 100 \text{ Units}$]

Particulars	Case A	Case B	Case C
Risk Coverage Desired [A]	60%	100%	125%
BSE 200 Futures Contracts Required for 100% Coverage [B]	200	200	200
BSE 200 Futures Contract Required to be taken for the desired Risk Coverage [A X B]	120 Contracts [200 X 60%]	200 Contracts [200 X 100%]	250 Contracts [200 X 125%]

2. Price of ETC Falls by 20% — Protection for Ranbir**(a) Change in BSE 200 Index Points**

Particulars	Case A
Market Price per Share of ETS in the beginning	₹100
Depreciation in % per Share of ETS	20%
Depreciation in Value per Share of ETS [₹100 X 20%]	₹20
Hedge Ratio (i.e. Beta Value of movement in ETS w.r.t to BSE 200)	0.80
Depreciation in BSE 500 Index [per metal index futures] [Depreciation in ETC Price ÷ Hedge Ratio] = $20 \div 0.80 = 25$ Points i.e. BSE 200 Index would have depreciated by 25 Points to 12,475 Points (12,500 - 25)	25 Points
Effect: Since BSE 200 Index has depreciated, Ranbir should buy the Nifty at a higher price than the ruling price. Therefore, Ranbir would pay cash to settle the loss arising out of contract.	Loss

(b) Cash Flow on Cross Hedge

Particulars	Case A	Case B	Case C
Extent of Risk Coverage [A]	60%	100%	125%
No. of Contracts [B]	120	200	250
Loss on Settlement of BSE 200 Index Futures per unit of BSE 200 Future = 25 Points or ₹25 [C]	₹25	₹25	₹25
Total Loss on Settlement of BSE 200 Index Futures = [No. of Contracts [B] X No. of Units per BSE Futures 100 x Gain in BSE 200 Index Points [C] This is the Cash Outflow for Ranbir] [D]	₹3,00,000 [120 x 25 x 100]	₹5,00,000 [200 x 25 x 100]	₹6,25,000 [250 x 25 x 100]



Cash Inflow => For Sale of 25,000 Shares of ETS in Spot Market = 25,000 Shares X ₹100 = ₹25,00,000 = Spot Price at the end + [Loss on settlement of Futures Contract ÷ Extent of Risk Hedged] = 25,000 Shares X ₹80 per Share + [D ÷ A] [E]	₹25,00,000 [20 Lakhs + (3 Lakhs ÷ 60%)]	₹25,00,000 [20 Lakhs + (5 Lakhs ÷ 100%)]	₹25,00,000 [20 Lakhs + (6.25 Lakhs ÷ 125%)]
Net Inflow for Ranbir Ltd [Cash Inflow on Spot Sale of Shares Less Cash Outflow on Future Buy of BSE 200 Index] [E - D] [F]	₹22 Lakhs [25 L - 3 L]	₹20 Lakhs [25L - 5L]	₹18.75 Lakhs [25 L - 6.25 L]

Alternative

Particulars	Case A	Case B	Case C
Actual Sale Value [Sale at Spot] [T_0]	₹25,00,000	₹25,00,000	₹25,00,000
Less: Sale Value if sold 6-Months later [T_6] [25,000 Shares X ₹80 per share]	₹20,00,000	₹20,00,000	₹20,00,000
Gain / (Loss) due to sale at T_0	₹5,00,000	₹5,00,000	₹5,00,000
Less: Loss in settlement of settlement of BSE Futures' Buy Contract [Entered into to hedge price risk]	(₹3,00,000)	(₹5,00,000)	(₹6,25,000)
Net Gain to Ranbir	₹2,00,000	—	—
Net Loss to Ranbir	—	—	₹1,25,000

3. Price of ETC Rises by 20% — Protection for Ranbir

(a) Change in BSE 200 Index Points

Particulars	Case A
Market Price per Share of ETS in the beginning	₹100
Appreciation in % per Share of ETS	20%
Appreciation in Value per Share of ETS [₹100 X 20%]	₹20.
Hedge Ratio (i.e. Beta Value of movement in ETS w.r.t to BSE 200)	0.80
Appreciation in BSE 500 Index [per futures contract] [Appreciation in ETC Price ÷ Hedge Ratio] = $20 \div 0.80 = 25$ Points i.e. BSE 200 Index would have appreciated by 25 Points to 12,525 Points (12,500 + 25)	25 Points
Effect: Since BSE 200 Index has appreciated, Ranbir would buy the Nifty at a lower price than the ruling price. Therefore, Ranbir would receive cash to settle the gain in his favour arising out of contract	Gain

(b) Cash Flow on Cross Hedge

Particulars	Case A	CaseB	Case C
Extent of Risk Coverage [A]	60%	100%	125%
No. of Contracts [B]	120	200	250
Gain on Settlement of BSE 200 Index Futures per Contract per Share of ETS = 25 Points or ₹25 [C]	₹25	₹25	₹25
Total Gain on settlement of BSE 200 Index Futures = [No. of Contracts [B] X No. of Units per BSE 200 Index 100 X Gain in BSE 200 Index Points [C] [This is Cash Inflow for Ranbir] [D]	₹3,00,000 [120 X 25 X 100]	₹5,00,000 [200 x 25 x 100]	₹6,25,000 [250 x 25 x 100]

Cash Inflow: For Sale of 25,000 Shares of ETC in Spot Market = 25,000 Shares X ₹100 = ₹25,00,000 = Spot Price at the end + [Gain on settlement of Futures Contract ÷ Extent of Risk Hedged] = 25,000 Shares X ₹120 per Share - [D ÷ A] [E]	₹25,00,000 [30 Lakhs - (3 Lakhs ÷ 60%)]	₹25,00,000 [30 Lakhs - (5 Lakhs ÷ 100%)]	₹25,00,000 [30 Lakhs - (6.25 Lakhs ÷ 125%)]
Net Inflow for Ranbir Ltd [Cash Inflow on Spot Sale of Shares Add Cash Inflow on Future Buy of BSE 200 Index] [E-D] [F]	₹28 Lakhs [25 L + 3 L]	₹30 Lakhs [25 L + 5 L]	₹31.25 Lakhs [25 L + 6.25 L]

Alternative

Particulars	Case A	Case B	Case C
Actual Sale Value [Sale at Spot] $[T_0]$	₹25,00,000	₹25,00,000	₹25,00,000
Less: Sale Value if sold 6-Months later $[T_6]$ [25,000 Shares X ₹ 120 per share]	₹30,00,000	₹30,00,000	₹30,00,000
Gain / (Loss) due to sale at T_0	(₹5,00,000)	(₹5,00,000)	(₹5,00,000)
Loss due to sale at T_0	₹5,00,000	₹5,00,000	₹5,00,000
Less: Loss hedged due to Cross Hedge in 6-Months' BSE Futures [Gain in settlement of BSE Futures' Buy Contract]	(₹3,00,000)	(₹5,00,000)	(₹6,25,000)
Net Loss to Ranbir	₹2,00,000	—	—
Net Gain to Ranbir	—	—	₹1,25,000

4. Price of ETC Falls by 30% — Protection for Ranbir**(a) Change in BSE 200 Index Points**

Particulars	Value
3-Months' Futures Index	12,500
Less: Actual Index as at T_6	(12,000)
Depreciation / Fall in BSE 200 Index	500 Points
Effect: Since BSE 500 Index has depreciated, Ranbir should buy the BSE 500 at a higher price than the ruling price. Therefore, Ranbir would pay cash to settle the loss arising out of contract.	Loss

(b) Cash Flow on Cross Hedge

Particulars	Value
Extent of Risk Coverage [A]	100%
No. of Contracts [B]	200
Loss on Settlement of BSE 200 Index Futures per unit of BSE 200 Index Future = 500 Points or ₹500 [C]	₹500



Total Loss on Settlement of BSE 200 Index Futures = [No. of Contracts [B] X No. of Units per BSE 200 Index Futures 100 X Fall in BSE 200 Index Points [C] [This is the Cash Outflow for Ranbir] [D]	₹100 Lakhs [200 X ₹500 X 100]
Cash Inflow For Sale of 25,000 Shares of ETC in Spot Market = 25,000 Shares X ₹100 = ₹25,00,000 [E]	₹25 Lakhs
Net Outflow for Ranbir Ltd [Cash Inflow on Spot Sale of Shares Less Cash Outflow on Future Buy of BSE 200 Index] [C - D] [F]	₹75 Lakhs [100L-25L]

Alternatively

Particulars	Case B
Actual Sale Value [Sale at Spot] $[T_0]$	₹25.00 Lakhs
Less: Sale Value if sold 6-Months later $[T_6]$ [25,000 Shares X ₹70 per share]	₹ 17.50 Lakhs
Gain / (Loss) due to sale at T_0	₹7.50 Lakhs
Less: Loss in settlement of settlement of BSE Futures' Buy Contract [Entered into to hedge price risk]	(₹100.00 Lakhs)
Net Loss to Ranbir	₹92.50 Lakhs

Inference:

- Cross Hedge will not yield the desired result if the actual performance of the Index with reference to the price of the share does not match up to the past performance i.e. correlation value.
- A correlation of 0.90 means that only 90% to the total variance in ETC's stock price change is explained by BSE 200 Index and is equivalent to Market Risk. The balance of 10% is unique risk.
- Hedging can offset only the market risk and not the unique risk. Therefore, given a ETC's Beta of 1.1 with reference to BSE Index, the price of ETC will not always move 1.1 times the BSE Index change. There is a 10% possibility that there will be a more than/ less than proportionate change (proportion is 1.1).
- Under such circumstances (wherein the change in Derivative Instrument i.e. BSE 200 Index and the Underlying Stock i.e. price of ETC, is not proportional), cross hedge can backfire and the investor may lose more than he had hedged for.

Illustration 19.

The February Pepper future traded at 16.80, the February 18.00 call at 0.45 and the February 18.00 put at 0.58. Both are options on the February future. Find out whether any arbitrage opportunity exists.

Solution:

(a) Cost of future = ₹16.80

(b) Cost of Pepper = Present Value of Exercise Price + Value of Call -Value of Put
= ₹0.45 - 0.58 + 18 = **₹17.87**

(c) **Conclusion:** Since there is difference between Spot Price and Futures Price, Arbitrage opportunity exists.

Illustration 20.

A sold in June Nifty futures contract for ₹3,60,000 on June 15, For this he had paid an initial margin of ₹34,000 to his broker. Each Nifty futures contract is for the delivery of 200 Nifties. On June 25, the index was closed on 1850. How much profit / loss A has made?

Solution:

1. Sale Price per NIFTY Future
 $= \text{Contract Amount} \div \text{Lot size}$
 $= ₹3,60,000 \div 200$
 $= ₹1,800$
2. Futures Price as on Jan 25
 $= ₹ 1,850$
3. Loss on Sale of Futures Contract
 $= (1,850 - 1,800) \times 200$
 $= ₹10,000.$

Illustration 21.

A portfolio manager owns 3 stocks

Stock	Shares owned	Stock price (₹)	Beta
1	1 lakh	400	1.1
2	2 lakhs	300	1.2
3	3 lakhs	100	1.3

The spot Nifty Index is at 1350 and futures price is 1352. Use stock index futures to (a) decrease the portfolio beta to 0.8 and (b) increase the portfolio beta to 1.5. Assume the index factor is ₹100. Find out the number of contracts to be bought or sold of stock index futures.

Solution:**1. Computation of Existing Portfolio Beta**

Security	Market Value of security (₹ Lakhs)	Proportion	Beta of the security	Weighted Beta
1	400	4/13	1.1	0.34
2	600	6/13	1.2	0.55
3	300	3/13	1.3	0.30
	1,300			1.19

Value per Futures Contract

$$= \text{Index Price per Unit} \times \text{Lot Size per Futures Contract}$$

$$= ₹1350 \times 100 = ₹1,35,000$$

2. Activity to Reduce Portfolio Beta to 0.8

- (a) **Object:** Reduce Portfolio Beta
- (b) **Activity:** Sell Index Futures



- Beta of Existing Portfolio $= \beta_1 = 1.19$
- Desired Beta of the New Portfolio $= \beta_N = 0.8$
- Contract Size $= 100$ Units
- Value per Futures Contract in NIFTY $= V_F = ₹ 1,350 \times 100 = ₹ 1,35,000$
- Value of the Portfolio $= V_p = ₹ 1,300$ Lakhs
- No. of Futures Contract to be sold:

$$= \text{Portfolio Value} \times \frac{[\text{Beta of the Portfolio} - \text{Desired Value of Beta}]}{\text{Value of a Futures Contract}}$$

$$= V_p \times \frac{\beta_1 - \beta_N}{V_F}$$

$$= ₹ 1,300 \text{ Lakhs} \times [(1.19 - 0.8) \div ₹ 1,35,000] = \mathbf{375 \text{ Contracts}}$$

3. Activity to increase the Portfolio Beta to 1.7

(a) **Object:** Increase Portfolio Beta

(b) **Activity:** Buy Index Futures

- Beta of Existing Portfolio $= \beta_1 = 1.19$
- Desired Beta of the New Portfolio $= \beta_N = 1.7$
- Value per Futures Contract in NIFTY $= V_F = ₹ 1,350 \times 100 = \mathbf{₹ 1,35,000}$
- Value of the Portfolio $= V_p = ₹ 1300$ Lakhs
- No. of Futures Contract to be sold:

$$= \text{Portfolio Value} \times \frac{[\text{Beta of the Portfolio} - \text{Desired Value of Beta}]}{\text{Value of a Futures Contract}}$$

$$= V_p \times \frac{\beta_1 - \beta_N}{V_F}$$

$$= ₹ 1300 \text{ Lakhs} \times [(1.70 - 1.19) \div ₹ 1,35,000] = \mathbf{491 \text{ Contracts}}$$

Illustration 22.

A unit trust wants to hedge its portfolios of shares worth ₹10 million using the BSE-SENSEX index futures. The contract size is 100 times the index. The index is currently quoted at 6,840. The beta of the portfolio is 0.8. The beta of the index may be taken as 1. What is the number of contracts to be traded?

Solution:

- Beta of Portfolio $= \beta_1 = 0.8$
- Beta of Index $= \beta_N = 1$
- Value per Futures Contract $= V_F = ₹ 6,840 \times 100 = ₹ 6.84$ Lakhs
- Value of the Portfolio $= V_p = ₹ 100$ Lakhs
- Hedge Ratio $= \text{Beta of the Portfolio} \div \text{Beta of the Index}$
 $= 0.8 \div 1 = 0.8$

- No. of Futures Contract to be traded:

$$= \text{Portfolio Value} \times \frac{\text{Hedge Ratio}}{\text{Value of a Futures Contract}}$$

$$= V_P \times \frac{\text{Hedge Ratio}}{V_F}$$

$$= ₹100 \text{ Lakhs} \times [0.8 \div ₹6.84 \text{ Lakhs}] = 11.70 \text{ i.e. 12 Contracts}$$

Illustration 23.

The price of 100 Gemini Stock as on 31st December, 2012 was ₹500 and the future price on the same stock on the same date for March, 2013 was quoted as ₹560. Other features of the contract and related information are as under:

Time to expiration	3 months (0.25 year)
Borrowing rate	20% p.a.
Annual dividend on the stock	15% payable before 31.3.2013.

Based on the above information, calculate futures price of Gemini Stock as on 31st December, 2012 and comment thereon.

Solution:

Securities of	Gemini
Spot Price [S_x]	₹500
Expected Rate of Dividend [y]	15% or 0.15
Borrowing Rate	20%
Tenor/Time Period [t] in Years	3 Months or 0.25 Year
Present Value of Dividend	$= 15\% \times 100 \times e^{-0.25 \times 0.20}$ $= 15\% \times 100 \div 1.05127$ $= 14.2685$
Adjusted Spot Price [Spot Price - Present Value of Dividend] [AS_x]	$500 - 14.2685 = ₹485.7315$
Theoretical Forward Price [TFP_x] $TFP_x = AS_x \times e^{(r-y) \times t}$	$= ₹485.7315 \times e^{0.20 \times 0.25}$ $= ₹485.7315 \times e^{0.05}$ $= ₹485.7315 \times 1.05127$ $= ₹510.63$
3-Months Futures Contract Rate [AFP_x]	₹560
TFP_x Vs. AFP_x	AFP_x is Higher
Inference	AFP_x is overvalued
Recommended Action	Buy Spot. Sell Future.

Inference: Since the Theoretical Forward Price is lesser than the Actual Forward Price, Arbitrage opportunity exists and gain can be pocketed by selling the index futures.



Illustration 24.

Which position on the index future gives a speculator, a complete hedge against the following transactions:

- The share of Yes Limited is going to rise. He has a long position on the cash market of ₹100 Lakhs on the Yes Limited. The beta of the Yes Limited is 1.25.
- The share of No Limited is going to depreciate. He has a short position on the cash market of ₹50 Lakhs on the No Limited. The beta of the No Limited is 0.90.
- The share of Fair Limited is going to stagnant. He has a short position on the cash market of ₹40 Lakhs of the Fair Limited. The beta of the Fair Limited is 0.75.

Solution:

1. Value to be traded in Futures [Index Value] = Hedge Ratio X Amount of Portfolio

2. Principles for deciding the Position on Index Futures [Opposite Position in relation to Stock]

Expectation on Stock Price	Action in Stock Market	Position in Index Futures
Rise	Buy / Long	Sell/Short
Fall	Sell/Short	Buy/Long

3. Position on the Index Futures

Sl. No.	Co.	Trend	Amount (₹)	Beta / Hedge Ratio	Index Value (₹)	Position
(a)	Yes Ltd.	Rise	100 Lakhs	1.25	1,25,00,000 [100 Lakhs x 1.25]	Short
(b)	No Ltd.	Depreciate	50 Lakhs	0.90	45,00,000 [50 Lakhs X 0.90]	Long
(c)	Fair Ltd.	Stagnant	40 Lakhs	0.75	30,00,000 [40 Lakhs x 0.75]	Long

Illustration 25.

The market is upbeat on strong economic growth. The next three months seems even better. You as the fund manager of Express Fund, an all equity portfolio, want to cash in on the opportunity. Express Fund has a portfolio beta of 1.50 with reference to BSE 30. You want your portfolio to gallop at upto double the pace of the benchmark index.

If you have been given a free hand to borrow at the risk free rate upto 35% of the Fund Value of ₹6 Crores, what will be your course of action?

If the 3-Months BSE 30 Index is traded at ₹10,000 per unit and the contract size is 100 Units per Futures Contract, how can you up your expectations without borrowing?

If the following are the transaction costs, what will be your preferred mode of increasing your return —

- For Risk Free Borrowing / Investment: ₹500 per lakh
- For Futures Contract: ₹3000 per Futures Contract
- For Buying / Selling in Spot Market: 0.25% of Transaction Value

Solution:**1. Risk Free Borrowal Route****(a) Object:** Increase Beta Value of the Portfolio**(b) Activity:** Sell Risk Free Investment (i.e. Borrow at Risk Free Rate) and invest in portfolio**(c) Computation of Factors:**

Factor	Notation	Value
Proportion of Existing Portfolio in New Portfolio	W_1	To be ascertained
Proportion of Risk Free Investments in New Portfolio	W_2	$1 - W_1$
Beta of Existing Portfolio	β_E	1.50
Beta of Risk Free Investment	β_R	0
Desired Beta of the New Portfolio [2 Times the Market = 2x1]	β_N	2

(d) Quantum of Risk Free Investments to be sold [Borrowal at Risk Free Rate]

Beta of a Portfolio = Weighted Average of the Betas of its Components

$$\Rightarrow \beta_N = [\beta_E \times W_1] + [\beta_R \times (1 - W_1)]$$

$$\Rightarrow 2 = [1.50 \times W_1] + [0 \times (1 - W_1)]$$

$$\Rightarrow 2 = 1.50 W_1$$

$$\Rightarrow W_1 = 2.00/1.50 = 1.3333 \text{ OR } 133.33\%$$

$$\Rightarrow W_2 = 1 - W_1 = 1 - 1.3333 = (0.3333) \text{ OR } (33.33\%)$$

(e) Activity Flow:

Activity	Time	Description
Borrow	T_0	Borrow at Risk Free Rate. Amount to be borrowed should not exceed 35% of Fund Value. Since borrowal of upto 33.33% is only required to reach the desired level, ₹ 2 Crore should be borrowed. [Fund Value ₹6 Crores X 33.33%]
Invest	T_0	Invest the amount of ₹2 Crores borrowed in the portfolio of Express Fund.
Sell	T_3	Sell portion of portfolio having a worth of ₹2 Crores as on that day, to repay the Risk Free Loans
Repay	T_3	Use the sale proceeds to repay the Risk Free Loan taken to invest in the Express Fund portfolio

Particulars	Scenario 1	Scenario 2	Scenario 3
BSE 30 grew by	10%	16%	24%
Portfolio would have grown by [Beta of Express Fund X Growth of BSE 30]	20%	32%	48%
Opening Value of Portfolio (before borrowal) [A]	₹ 6.00 Cr.	₹ 6.00 Cr.	₹ 6.00 Cr.
Add: Amount borrowed and invested in Express Fund	₹ 2.00 Cr.	₹ 2.00 Cr.	₹ 2.00 Cr.
Express Fund value which would have grown	₹8.00 Cr.	₹8.00 Cr.	₹8.00 Cr.
Add: Growth of Portfolio Value in ₹ [B]	₹1.60 Cr. [8 Cr. X 20%]	₹2.56 Cr. [8 Cr. X 32%]	₹3.84 Cr. [8 Cr. X 48%]



Value of Portfolio (before settlement of borrowals)	₹9.60 Cr.	₹10.56 Cr.	₹11.84 Cr.
Less: Loan repaid	₹2.00 Cr.	₹2.00 Cr.	₹2.00 Cr.
Value of Portfolio after Repayment	₹7.60 Cr.	₹8.56 Cr.	₹9.84 Cr.
Growth on Value before borrowal [B ÷ A]	26.67%	42.67%	64.00%
	[1.60 ÷ 6.00]	[2.56 ÷ 6.00]	[3.84 ÷ 6.00]
Growth compared with growth of BSE 30	2.67 Times	2.67 Times	2.67 Times
	[26.67 / 10]	[42.67 / 16]	[64.00 / 24]

Inference: By borrowing at risk free rate and investing in the Express Fund Portfolio, the value of fund has increased at a pace 2.67 times of the growth of BSE 30. Without upping the Beta factor of the portfolio, the fund would have earned only 1.50 times of the growth of BSE 30.

2. Using Index Futures

[This is the same as Cross Hedging using Index Futures]

(a) Object: Increase Beta Value of the Portfolio (i.e. Express Fund)

(b) Activity: Buy Index Futures

Logic for Buying Futures: In a Bullish Market, when prices are rising, futures contract are entered into to freeze the buy price. This will ensure that whatever be the increase in price, purchase price is fixed. And if on maturity date, the spot purchase price is higher than futures price, gain can be pocketed.

(c) Computation of Factors:

Factor	Notation	Value
Beta of Existing Portfolio	β_E	1.50
Desired Beta of the New Portfolio [2 Times the Market = 2 x 1]	β_N	2.00
3-Months' Future Value per unit of BSE 300 Index	BSE	₹ 10,000 per Unit
Contract Size	N	100 Units
Value per Futures Contract in BSE 300 [BSE X N = 10,000 X 100]	V_F	₹10 Lakhs
Value of the Portfolio (Express Fund)	V_P	₹6 Crores

(d) No. of Futures Contract to be Bought:

$$= \text{Portfolio Value} \times \frac{[\text{Desired Value of Beta} - \text{Beta of the Portfolio}]}{\text{Value of a Futures Contract}}$$

$$= V_P \times \frac{\beta_1 - \beta_N}{V_F}$$

$$= ₹6,00,00,000 \times [(2.00 - 1.50) \div ₹10,00,000]$$

$$= 60 \times 0.50$$

= 30 Contracts

(e) Activity Flow:

Activity	Time	Description
Contract	T_0	Enter into 3-Months' Futures Contract for selling BSE 30 Index at ₹10000 per unit. No. of contracts to be entered into is 30.
Settle	T_3	Settle the price difference on the maturity date. Pocket the gain. Gain adds upto the value of the Portfolio i.e. Express Fund.

(f) Evaluation:

Particulars	Scenario 1	Scenario 2	Scenario 3
BSE 30 grew by	10%	16%	24%
Portfolio would have grown by [Beta of Express Fund x Growth of BSE 30]	15%	24%	36%
Opening Value of Portfolio (before borrowal) [A]	₹6.00 Cr.	₹ 6.00 Cr.	₹ 6.00 Cr.
Add: Growth of Portfolio Value in ₹ [B]	₹0.90 Cr. [6 Cr. X 15%]	₹1.44 Cr. [6 Cr. X 24%]	₹2.16Cr. [6 Cr. x 36%]
Value of Portfolio after 3-Months	₹6.90 Cr.	₹7.44 Cr.	₹8.16 Cr.
Growth compared with growth of BSE 30	2.67 Times [26.67 / 10]	2.67 Times [42.67 / 16]	2.67 Times [64.00 / 24]
Value per Futures Contract	₹ 10 Lakhs	₹10 Lakhs	₹10 Lakhs
No. of Futures Contract entered	30	30	30
Total Value of Futures Contract	₹3.00 Cr.	₹3.00 Cr.	₹3.00 Cr.
Gain due to increase in value	₹0.30 Cr. [3.00 X 10%]	₹0.48 Cr. [3.00 X 16%]	₹0.72 Cr. [3.00 x 24%]
Value of Express Fund after settlement of BSE 30 Index Futures Contract	₹7.20 Cr. [6.90 + 0.30]	₹7.92 Cr. [7.44 + 0.48]	₹8.88 Cr. [8.16 + 0.72]
Total Increase in Value of Portfolio	₹1.20 Cr. [7.20-6.00]	₹1.92 Cr. [7.92-6.00]	₹2.88Cr. [8.88- 6.00]
Growth in %	20% [1.20 ÷ 3.00]	32% [1.92 ÷ 6.00]	48% [2.88 ÷ 6.00]

(g) Inference: By buying index futures, the growth in value of fund value has moved at two times the pace of growth in index.

Illustration 26.

Fill up the blanks in the following matrix —

Case	Portfolio Value	Existing Beta	Outlook	Activity	Desired Beta	No. of Futures Contracts
M	?	1.20	Bullish	?	1.8	90
N	₹3,60,00,000	?	?	Buy Index Futures	2.3	45
O	₹2,00,00,000	1.60	?	?	1.2	?
P	₹6,40,00,000	1.10	Bullish	?	?	48
Q	₹2,50,00,000	1.40	Bearish	?	1	?
R	₹5,00,00,000	?	Bearish	Sell Index Futures	1.25	45

S&P index is quoted at 4000 and the lot size is 100.

**Solution:**

Case	Portfolio Value	Existing Beta	Outlook	Activity	Desired Beta	No. of Futures Contracts
M	₹6,00,00,000	1.20	Bullish	Buy Index Futures	1.8	90
N	₹3,60,00,000	1.80	Bullish	Buy Index Futures	2.3	45
O	₹2,00,00,000	1.60	Bearish	Sell Index Futures	1.2	20
P	₹6,40,00,000	1.10	Bullish	Buy Index Futures	1.4	48
Q	₹2,50,00,000	1.40	Bearish	Sell Index Futures	1	25
R	₹5,00,00,000	1.61	Bearish	Sell Index Futures	1.25	45

Value per Futures Contract = Index Price per Unit X Lot Size per Futures Contract

= ₹4000 x 100 = ₹4 Lakhs

1. Case M

(a) **Inference:** Outlook is Bullish and the desired Beta is more than the existing Beta. Therefore, Index Futures Contract **should be bought**.

(b) **Number of Futures Contract** = Portfolio Value X $\frac{[\text{Desired Value of Beta} - \text{Beta of the Portfolio}]}{\text{Value of a Futures Contract}}$

$$\Rightarrow N_F = V_p \times \frac{\beta_N - \beta_E}{V_F}$$

$$\Rightarrow 90 = V_p \times (1.80 - 1.20) / ₹4 \text{ Lakhs}$$

$$\Rightarrow 0.60 V_p = 90 \times ₹4 \text{ Lakhs}$$

$$\Rightarrow V_p = ₹3.6 \text{ Crores} \div 0.60 = ₹600 \text{ Lakhs.}$$

2. Case N

(a) **Inference:** Activity is to Buy Index Futures. Therefore, outlook is **Bullish**. Therefore, existing Beta should be lower.

(b) **Number of Futures Contract** = Portfolio Value X $\frac{[\text{Desired Value of Beta} - \text{Beta of the Portfolio}]}{\text{Value of a Futures Contract}}$

$$\Rightarrow N_F = V_p \times \frac{\beta_N - \beta_E}{V_F}$$

$$\Rightarrow 45 = ₹3.60 \text{ Cr.} \times (2.30 - \beta_E)$$

$$\Rightarrow 45 \times ₹4 \text{ Lakhs} = ₹3.60 \text{ Cr.} \times (2.30 - \beta_E)$$

$$\Rightarrow 2.30 - \beta_E = ₹1.80 \text{ Crores} \div ₹3.60 \text{ Crores}$$

$$\Rightarrow 2.30 - \beta_E = 0.50$$

$$\Rightarrow \beta_E = 2.30 - 0.50 = 1.80$$

3. Case O

(a) **Inference:** Desired Beta is lower than existing Beta. Therefore, **outlook is bearish** and apt activity is to **sell index futures**.

(b) **Number of Futures Contract** = Portfolio Value X $\frac{[\text{Beta of the Portfolio} - \text{Desired Value of Beta}]}{\text{Value of a Futures Contract}}$

$$\Rightarrow N_F = V_p \times \frac{\beta_N - \beta_E}{V_F}$$

$$\Rightarrow N_F = ₹2.00 \text{ Cr.} \times (1.60 - 1.20) / ₹4 \text{ Lakhs}$$

$$\Rightarrow N_F = ₹ 2.00 \text{ Cr.} \times 0.40 / ₹ 4 \text{ Lakhs}$$

$$\Rightarrow N_F = ₹ 80 \text{ Lakhs} / ₹ 4 \text{ Lakhs} = \mathbf{20 \text{ Contracts}}$$

4. Case P

(a) Inference: Desired Beta is higher than existing Beta. Therefore, **outlook is bullish** and apt activity is to **buy index futures**.

$$\mathbf{(b) \text{ Number of Futures Contract}} = \text{Portfolio Value} \times \frac{[\text{Desired Value of Beta} - \text{Beta of the Portfolio}]}{\text{Value of a Futures Contract}}$$

$$\Rightarrow N_F = V_P \times \frac{\beta_N - \beta_E}{V_F}$$

$$\Rightarrow 48 = ₹ 6.40 \text{ Cr.} \times (\beta_N - 1.10) / ₹ 4 \text{ Lakhs}$$

$$\Rightarrow 48 = 160 \times (\beta_N - 1.10)$$

$$\Rightarrow 48/160 = \beta_N - 1.10$$

$$\Rightarrow 0.30 = \beta_N - 1.10$$

$$\Rightarrow \beta_N = 1.10 + 0.30 = \mathbf{1.40}$$

5. Case Q

(a) Inference: Desired Beta is lower than existing Beta and outlook is bearish. Therefore, apt activity is to **sell index futures**.

$$\mathbf{(b) \text{ Number of Futures Contract}} = \text{Portfolio Value} \times \frac{[\text{Beta of the Portfolio} - \text{Desired Value of Beta}]}{\text{Value of a Futures Contract}}$$

$$\Rightarrow N_F = V_P \times \frac{\beta_N - \beta_E}{V_F}$$

$$\Rightarrow N_F = ₹ 2.50 \text{ Cr.} \times (1.40 - 1.00) / ₹ 4 \text{ Lakhs}$$

$$\Rightarrow N_F = ₹ 2.50 \text{ Cr.} \times 0.40 / ₹ 4 \text{ Lakhs}$$

$$\Rightarrow N_F = ₹ 1 \text{ Cr.} / ₹ 4 \text{ Lakhs} = \mathbf{25 \text{ Contracts}}$$

6. Case R

(a) Inference: Outlook is bearish and the activity is to sell Index Futures. Therefore, Existing Beta should be higher than desired Beta.

$$\mathbf{(b) \text{ Number of Futures Contract}} = \text{Portfolio Value} \times \frac{[\text{Beta of the Portfolio} - \text{Desired Value of Beta}]}{\text{Value of a Futures Contract}}$$

$$\Rightarrow N_F = V_P \times \frac{\beta_N - \beta_E}{V_F}$$

$$\Rightarrow 45 = ₹ 5 \text{ Cr.} \times (\beta_E - 1.25) / ₹ 4 \text{ Lakhs}$$

$$\Rightarrow 45 = 125 \times (\beta_E - 1.25)$$

$$\Rightarrow \beta_E - 1.25 = 45 / 125$$

$$\Rightarrow \beta_E - 1.25 = 0.36$$

$$\Rightarrow \beta_E = 0.36 + 1.25 = \mathbf{1.61.}$$



7.2 OPTIONS

An option is a contractual agreement that gives the option buyer the right, but not the obligation, to purchase (in the case of a call option) or to sell (in the case of a put option) a specified instrument at a specified price at any time of the option buyer's choosing by or before a fixed date in the future. Upon exercise of the right by the option holder, an option seller is obliged to deliver the specified instrument at the specified price.

For stock options, the amount is usually 100 shares. Each option contract has a buyer, called the holder, and a seller, known as the writer. If the option contract is exercised, the writer is responsible for fulfilling the terms of the contract by delivering the shares to the appropriate party. In the case of a security that cannot be delivered such as an index, the contract is settled in cash. For the holder, the potential loss is limited to the price paid to acquire the option. When an option is not exercised, it expires. No shares change hands and the money spent to purchase the option is lost. For the buyer, the upside is unlimited. Option contracts, like stocks, are therefore said to have an asymmetrical payoff pattern. For the writer, the potential loss is unlimited unless the contract is covered, meaning that the writer already owns the security underlying the option. Option contracts are most frequently as either leverage or protection. As leverage, options allow the holder to control equity in a limited capacity for a fraction of what the shares would cost. The difference can be invested elsewhere until the option is exercised. As protection, options can guard against price fluctuations in the near term because they provide the right to acquire the underlying stock at a fixed price for a limited time. Risk is limited to the option premium (except when writing options for a security that is not already owned). However, the costs of trading options (including both commissions and the bid/ask spread) is higher on a percentage basis than trading the underlying stock. In addition, options are very complex and require a great deal of observation and maintenance also called option.

Features of Options

The important features of options contracts are as follows :

- The buyer has the right to buy or sell the asset.
- To acquire the right of an option, the buyer of the option must pay a price to the seller. This is called the option price or the premium.
- The exercise price is also called the fixed price, strike price or just the strike and is determined at the beginning of the transaction. It is the fixed price at which the holder of the call or put can buy or sell the underlying asset.
- Exercising is using this right the option grants you to buy or sell the underlying asset. The seller may have a potential commitment to buy or sell the asset if the buyer exercises his right on the option.
- The expiration date is the final date that the option holder has to exercise her right to buy or sell the underlying asset.
- Time to expiration is the amount of time from the purchase of the option until the expiration date. At expiration, the call holder will pay the exercise price and receive the underlying securities (or an equivalent cash settlement) if the option expires in the money. (We will discuss the degrees of moneyness later in this session.) The call seller will deliver the securities at the exercise price and receive the cash value of those securities or receive equivalent cash settlement in lieu of delivering the securities.
- Defaults on options work the same way as they do with forward contracts. Defaults on over-the-counter option transactions are based on counterparties, while exchange-traded options use a clearing house.
- Option Premium is the consideration for the Writer of the option, for assuming or taking up the liability to perform. It is the price to be paid by the Holder, irrespective of whether the option is exercised or not.

Differentiate Options from Forward Contracts and Futures Contracts:

Aspect	Forward Contracts	Futures Contracts	Option Contracts
Trading Place	No specific place. Can be traded like any commodity.	Traded on Stock Exchanges.	Traded on Stock Exchanges.
Settlement/ Cash Flow	At the time of delivery of asset, i.e. at the end of the contract period.	Profit / Loss is settled on a daily basis based on movement in Current Futures Price.	Option writer collects premium at the inception of the contract.
Closure of Contract	Delivery is must.	- Physical Delivery - Payment of price differential - Taking an opposite position, and cancelling out the contract.	- Physical Delivery - Payment of price differential - Taking an opposite position, and canceling out the contract.
Price Fixation	Negotiated between parties to the contract.	Determined by the market forces i.e. based on Demand and Supply.	Exercise Price / Strike Price fixed by the Stock Exchange. Premium is market determined.
Nature	Contracts are not standardized. These are customized.	Contracts are standardized.	Contracts are standardized.
Obligation to Perform	Both parties are under obligation to perform.	Both parties are under obligation to perform.	Only the Writer / Seller of the option is under obligation to perform.
Timing	Contracts can be entered into for any period at any time.	Exchange would fix the expiry date. Contracts can be entered into any time for periods upto the expiry date for that contract.	Exchange would fix the expiry date. Contracts can be entered into any time for periods upto the expiry date for that contract.
Guarantee of Performance	Performance is not guaranteed. There is liquidity risk.	Stock Exchange will ensure performance. There is little or no liquidity risk.	Stock Exchange will ensure performance. There is little no liquidity risk.

Options: Advantages and Disadvantages

Feature	Advantage	Disadvantage	Effect on Holder/Writer
Cost	Options are an inexpensive way to gain access to the underlying investment without having to buy stock	As a form of insurance, an option contract may expire worthless. This risk increases the greater the extent to which the option is out of the money and the shorter the time until expiration.	Holder may be disadvantaged due to expiry. Writer would be advantaged as s/he need not make delivery once the option has expired.



Leverage	Options enable investors to stump up less money and obtain additional gain.	Investors should realize that options' leverage can impact performance on the down side as well.	Writers of naked calls are exposed to unlimited risk.
Marketability	Option terms trade on an exchange and as such are standardized.	Regulatory intervention can prevent exercise which may not be desirable.	Both parties to an options transaction benefit from standardized and enforceable terms.
Hedging	Options may be used to limit losses.	The investor may end up being incorrect as to the direction and timing of a stock's price and may implement a less than perfect hedge.	Both the holder and the writer may be (dis) advantaged depending upon which side of the trade they assume and the ultimate direction of the underlying security.
Return enhancement	Options may be used to enhance a portfolio's return.	The investor may end up being incorrect as to the direction and timing of a stock's price, rendering the attempt at enhanced portfolio return worthless.	Both the holder and the writer may be (dis) advantaged depending upon which side of the trade they assume and the ultimate direction of the underlying security.
Diversification	One can replicate an actual stock portfolio with the options on those very stocks.	Diversification cannot eliminate systematic risk.	
Regulation	Terms of listed options are regulated.	Restrictions upon exercise may occur by regulatory fiat (OCC, SEC, court, other regulatory agency).	While in some cases necessary, regulatory fiat can disrupt what may be a profitable trade, affecting holder and writer alike.

The Terms Used In Relation To Options Contract:

(a) Strike Price / Exercise Price:

Strike Price / Exercise Price is the price at which the option can be exercised i.e. the price at which the underlying asset can be bought or sold on the expiry date (European Option) or before the expiry date (in case of American Option). Strike Price / Exercise Price is fixed by the Stock Exchange, and not by the Writer or Holder of an option. The Stock Exchange fixes a series of prices spaced at appropriate price intervals for an underlying asset. An investor can choose his preferred Strike Price from such a range of prices.

Example: Strike Price for December 2012 Options Contract on Shares of Wipro expiring on 27.12.2012 will be — ₹1900, ₹1925, ₹1950, ₹1975, ₹2000 etc. An investor can choose to buy an option with an Exercise Price of ₹1900, while another might choose ₹1950.

(b) Premium

Premium is the price at which the options contract for an asset with a given expiry date and strike price is traded. It is paid by the Buyer to the Writer / Seller of the option. The writer keeps the premium whether or not the option is exercised. It is the consideration paid to the Writer / Seller for undertaking to deliver / buy the underlying security, if the option is exercised. Option Premium is

market determined, i.e. based on the demand for the options with a given strike price. Premium payable on an Options Contract depends upon various factors like Strike Price, Expiry Date etc.

Option Premium consists of two components — (i) Intrinsic Value; and (ii) Time Value

(c) Expiry Date:

It is the last day (in the case of American style) or the only day (in the case of European style) on which an option may be exercised. Generally, Options contract on any security is traded based on its strike price and the expiry date.

Example: In November 2012, the following options on TCS Shares can be traded —

- 2012 December TCS Series of Options Contract with Strike Prices of ₹ 1900, ₹ 1925, ₹ 1950, ₹ 1975, ₹ 2000 etc.
- 2013 January TCS Series of Options Contract with Strike Prices ₹ 1,950, ₹ 1,975, ₹ 2000, ₹ 2025, ₹ 2050 etc.

(d) Contract Size:

Contract size is the number of units of the underlying asset covered by an options contract. Contract size is fixed by the Exchange.

Example: 100 Shares of Wipro, 200 Kgs of Wheat, etc.

“In-the-Money”, “At-the-Money”, and “Out-of-Money”, with reference to Options:

(a) These terms describe the position of options contract from the trader's perspective (both Buyer and Seller of an option).

(i) In the Money: It is a situation, when exercising the option would be advantageous and result in gain or profit to the option holder.

(ii) At the Money: Exercise of option in this position, would neither result in a gain or loss to the option holder. At this stage the Current Market Price (CMP) and the Exercise Price (EP) are equal.

(iii) Out of Money: Exercise of option in this situation would result in a loss to the Option Holder.

(b) Call Option and Put Option: An option-holder will exercise his option, only when it is advantageous to exercise it, based on the Strike Price and the Market Price on the date of expiry. Action on Options are as follows based on the market price on the date of expiry –

Situation	Call Option		Put Option	
	Position	Action	Position	Action
CMP < EP	Out of Money	Lapse. Buying at EP will not be advantageous. Do not exercise the Option.	In the Money	Exercise. Selling at EP would be advantageous. Exercise the Option.
CMP = EP	At the Money.	Indifference Point.	At the Money.	Indifference Point.
CMP > EP	In the Money	Exercise. Buying at EP would be advantageous. Exercise the Option.	Out of Money	Lapse. Selling at EP will not be advantageous. Do not exercise the Option.

Note: CMP = Current Market Price on Exercise / Expiry Date; EP = Exercise Price



Types of Options:

(a) Based on Nature of Activity:

Call Option	Put Option
Option which gives the holder the right to BUY an asset, but not an obligation to buy.	Option which gives the holder the right to SELL an asset, but not an obligation to sell.
Call Option will be exercised only when the Exercise Price is lower than the Market Price. [Only then it will be advantageous to the Holder]	Put Option will be exercised only when the Exercise Price is higher than the Market Price. [Only then it will be advantageous to the Holder]
Seller / Writer is under an obligation to sell the underlying asset if the Buyer exercises his option to buy the shares / stock.	Seller / Writer is under an obligation to buy the underlying asset if the Buyer exercises his option to sell his shares / stock.

(b) Based on Exercising the Option:

American Option	European Option
Option under which holder can exercise his right at any time before expiry date.	Option under which holder can exercise his right only on the expiry date.

Buying a Call Option (Long Call)

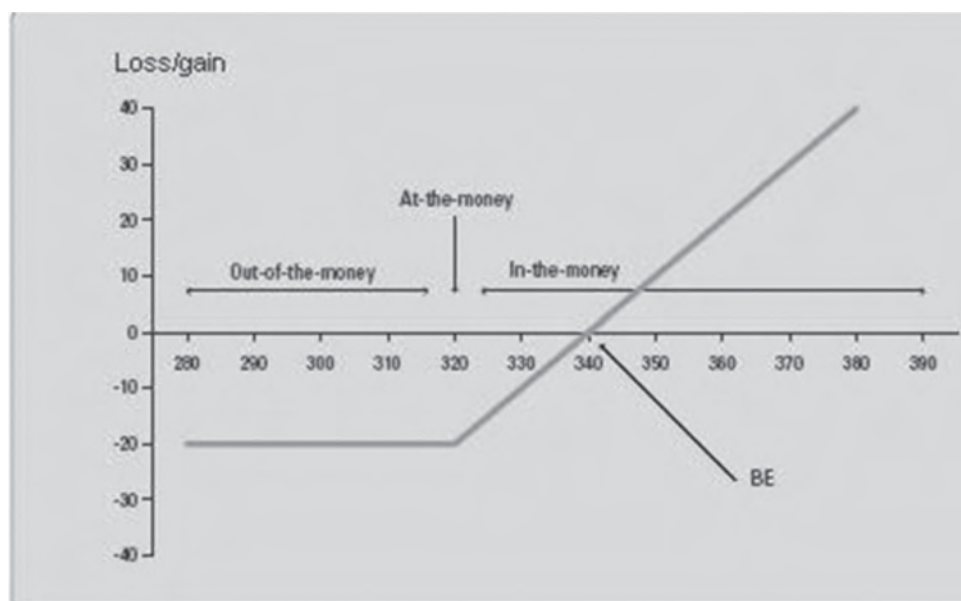
A call option provides the holder the right, but not the obligation, to buy a certain security at a specified price on a specified date. 'Call' means to redeem or effect a claim. If an investor expects the 'company A' share to rise from the present price of ₹ 320, he can buy a call option on 'company A', e.g. with a strike price of ₹ 320. This call option gives the investor the right, but not the obligation, to buy 100 'company A' shares at a price of ₹ 320 at any time up to the expiry date. Options on single shares are

normally of 100 underlying shares.

With an option premium of 20 per underlying share and a price of 360 upon the expiry of the call option, the investor's capital gain may be calculated as follows:

Expiration gain: $(360-320) \times 100$	₹ 4,000
Option premium: 20×100	₹ 2,000
Net gain (4,000 - 2,000)	₹ 2,000

If the expiry price is 310 instead, the gain upon expiration is 0, meaning that the investor has suffered a loss of ₹ 2,000 – or in other words, the option premium or the price of the option.



The figure shows the potential capital gain and loss upon expiry of the call option. Note that the loss is limited to the premium, which has already been paid, whereas the capital gain is unlimited. The figure also shows the payoff for a call option when the option is 'in-', 'at-' or 'out-of-the-money'. A call option is said to be at-the-money when the strike price equals the price of the underlying asset. If the price is less than or above the strike price, the call option is out-of-the money and in the money, respectively. The figure also shows that the investor will break even (BE) at a price level of 340.

Investment in options can achieve considerable capital gains. Let us presume once more that the price of the share increases from 320 to 360. If you invest in the share, your investment will yield a percentage gain of:

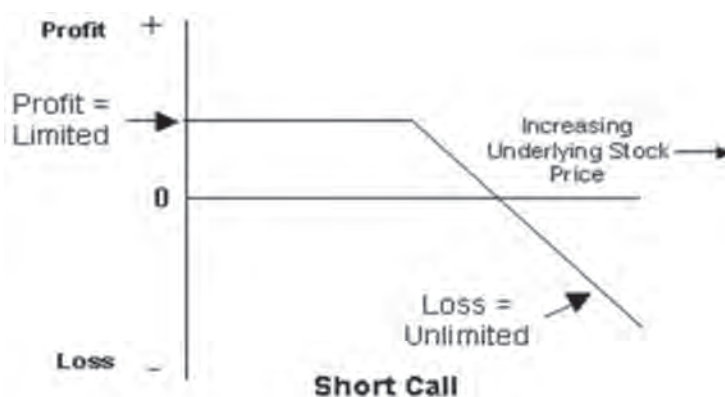
$$(360-320) / 320 = 12.5 \%$$

Now compare this with a corresponding investment in the above call option with a strike price of 320 and has a premium of 20. Here the yield amounts to:

$$(40-20) / 20 = 100 \%$$

Writing or Selling a Call Option (Short Call):

Writing or Selling a Call Option is when you give the buyer of the call option the right to buy a stock from you at a certain price by a certain date. In other words, the seller (also known as the writer) of the call option can be forced to sell a stock at the strike price. The seller of the call receives the premium that the buyer of the call option pays. If the seller of the call owns the underlying stock, then it is called "writing a covered call." If the seller of the call does NOT own the underlying stock, then it is called "writing a naked call." Obviously, in this instance it is "naked" because the seller does not own the underlying stock. The best way to understand the writing of a call is to read the following example.



Example of Writing / Selling a Call Option:

It's January 1st and Mr. Pessimist owns 100 shares of GOOG stock that he bought 5 years ago at \$100. The stock is now at \$600 but Mr. Pessimist thinks that the price of GOOG is going to stay the same or drop in the next month, but he wants to continue to own the stock for the long term. At the same time, Mr. Bull just read an article on GOOG and thinks GOOG is going to go up \$20 in the next few weeks because GOOG is about to have a press release saying they expect their China traffic to be very strong for the year.

Mr. Pessimist gets a quote on the January \$610 call on GOOG and sees the price at bid \$5.00 and ask \$5.10. He places an order to SELL 1 GOOG January \$610 call as a market order. Mr. Bull also places a market order to BUY the very same GOOG option contract. Mr. Pessimist's order immediately gets filled at \$5.00 so he receives \$500 (remember each option contract covers 100 shares but is priced on a per share basis) in his account for selling the call option. Mr. Bull immediately gets filled at \$5.10 and pays \$510 for the GOOG January \$610 call. The market maker gets the \$10 spread.

Once the trade is made, Mr. Pessimist hopes that GOOG stays below \$610 until the third Friday in January. Meanwhile, Mr. Bull is hoping that GOOG closes well above \$610 by the third Friday in January. If GOOG closes at \$610 or below then the call option will expire worthless and Mr. Pessimist profits the \$500 he received for writing / selling the call; and Mr. Bull loses his \$510. If GOOG closes at \$620, then Mr. Bull would exercise the call option and buy the 100 shares of GOOG from Mr. Pessimist at \$610. Mr. Pessimist has now received \$500 for writing the call option, but he has also lost \$1000 because he had to sell a stock that was worth \$620 for \$610. Mr. Bull would be happy in that he spent \$510, but he made \$1000 on the stock because he ended up paying \$610 for a stock that was worth \$620.

I noted earlier that 35% of option buyers lose money and that 65% of option sellers make money. There is a very simple explanation for this fact. Since stock prices can move in 3 directions (up/down/sideways) it follows reason that only 1/3 of the time will the stock move in the direction that the buyer of the stock or the buyer of the put wants. Therefore, 2/3 of the time the seller of the option is the one making the money!

To think of this another way, think of option trading as the turtle and the hare story. Option buyers are the rabbits that are generally looking for a quick move in stock prices, and the option sellers/writers are the turtles that are looking to make a few dollars each day. In the YHOO examples above we said that if YHOO is at \$27 a share and the October \$30 call is at \$0.25 then not many option traders expect YHOO to climb above \$30 a share between now and the 3rd Friday in October. If today was October 1st and you owned 100 shares of YHOO, would you like to receive \$25 to give someone the right to call the stock away from you at \$30? Maybe, maybe not. But if that October \$30 call was currently trading at \$2 and you could get \$200 for giving someone the right to call you stock away at \$30, wouldn't you take that? Isn't it very unlikely that with only a few weeks left to expiration that YHOO would climb \$3 and your YHOO stocks would be called away? In effect, you would be selling your shares for \$32 (the

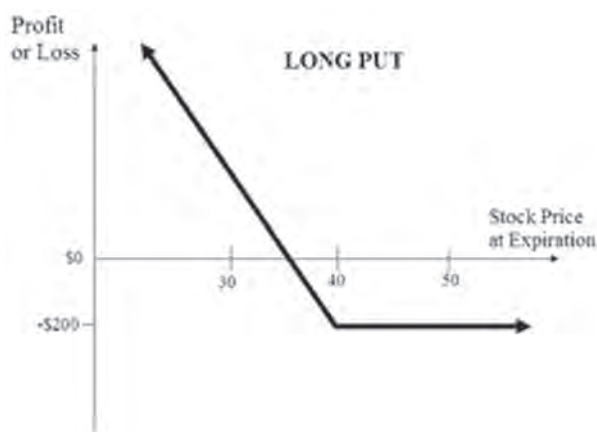
\$30 strike price plus the \$2 option price). Option sellers write covered calls as a way to add income to their trading accounts by receiving these little premiums each month, hoping that the stock doesn't move higher than the strike price before expiration. If the October calls expire worthless on the 3rd Friday in October, then the immediately turn around and sell/write the November calls.

When you own the underlying stock and write the call it is called writing a covered call. This is considered a relative safe trading strategy. If you do not own the underlying stock, then it is called writing a naked call. This is considered a very risky strategy.

If today is October 1st and YHOO is at \$27 and we write the YHOO \$30 call to receive \$2.00, we have 21 days to hope that YHOO stays below \$30. Each day that goes by and YHOO stays below \$30, it become less and less likely that YHOO will pop over \$30 so the option price starts decreasing. On October 10th, if YHOO is still at \$27 then the October \$30 call would probably be trading at \$1.10 or so. This is called the "time decay" of options in that each day that goes by the odds of a price movement become less and less.

Buying a Put (Long Put)

An investor is said to be long a put option when he has purchased a put option and currently owns the put. The term "going long" refers to buying a security, and applies to being long a stock, long a call, and long a put. When you are long a put you are hoping that the price of the underlying stock or index falls below the strike price of the put option. When the stock price is above the strike price, the long put option is "out of the money." When the stock price is at the strike price, the long put option is "at the money." And when the stock price is below the strike price, the long put option is "in the money."



Being long a put option is the opposite of being "short a put." The person that buys the put option has a long position, but the person that sold or wrote the put is "short a put."

The person that is "long a put" wants the stock price to fall to \$0 so that his profit is maximized. The person that is sold or wrote the put and is "short a put" wants the stock price to stay at or go above the strike price so that the put option expires worthless.

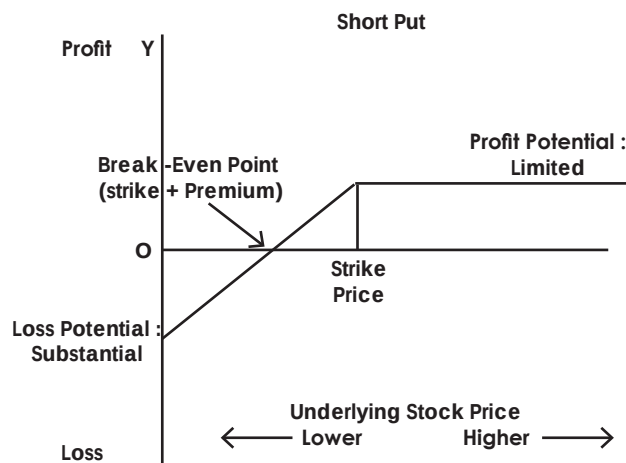
Writing a Put (Short Put)

Going short by writing a put is generally considered more risky than going long since you're obligated to honor your side of the contract should the holder decide to exercise. In general, you would choose this strategy because you believe the stock's price will rise above the strike price, leaving the option without any value at expiration and you with the premium.

A more conservative reason to sell a put is if you have a target price at which you'd like to buy shares of a stock. Should the option be exercised, you'll be forced to pay for the stock. The premium you received will reduce your net price paid on those shares.



For example, say you write a put with a strike price of \$35 and a premium of \$2. If the stock's price drops to \$31, you'll likely be assigned the option. You'll have to pay \$3,500 for the shares, but the \$200 you received at the outset means your net price for the shares is \$3,300, or \$33 per share. If the stock's price rises again in the future, you could realize considerable gains.



In the graph shown here, the vertical (Y-axis) represents profit and loss, while the horizontal (X-axis) shows the price of the underlying stock. The blue line shows your potential profit or loss given the price of the underlying.

Determination of Option Premium :

The factors on which the level of premium depend are —

- (a) **Exercise Price:** Exercise Price or Strike Price refers to the price at which the contract is agreed upon. When buying an Option, an investor can choose from a set of Strike Prices, for which Options can be bought / sold. Based on Strike Price chosen, the Option Premium will vary as follows —

Exercise Price	Call Option Premium is —	Put Option Premium is —
High	LOW. As the Exercise Price goes up, the value of Option (i.e. $CMP - EP$) goes down. Therefore, it becomes less valuable.	HIGH. As the Exercise Price goes up, the value of Option (i.e. $EP - CMP$) goes up. Therefore, it becomes more valuable. The value of obligation to perform is also high from holder's perspective.
Low	HIGH. As the Exercise Price goes down, the value of Option (i.e. $CMP - EP$) goes up. Therefore, it becomes more valuable. Value of obligation to perform is also high from holder's perspective.	LOW. As the Exercise Price goes up, the value of Option (i.e. $EP - CMP$) goes down. Therefore, it becomes less valuable.

- (b) **Current Price of the Underlying Asset:** Other things remaining constant, if the current market price of the asset goes up, value of the call option increases (since the possibility of exercising the call also increases) and put option decreases. If the Current Market Price decreases, value of put option increases (as the possibility of exercising the put option also increases), value of and call option decreases.
- (c) **Maturity or Expiry Date:** Longer the time to maturity, higher the period of uncertainty, and hence higher the Option Premium. Therefore, an option with 3 months to maturity will have a higher premium than an option with 1 month to maturity.

- (d) **Volatility of Stock Prices:** Volatility of stock price in the spot market (Cash Market) also contributes to premium. Higher volatility would mean a prices hitting the extremes, and the buyer of option would exercise his option, which would result in a higher obligation on the part of the seller of the option. Therefore, the values of both calls and puts increase as volatility increases. Greater the volatility, higher will be the premium, and vice-versa.
- (e) **Interest Rate Movement:** As interest rates increases, the expected return required by the investors on the stock also increases. Therefore, the present value of the future returns decreases. If the interest rate decreases, the expectations also go down.
- (f) **Market Factors:**
- (i) Liquidity in the market i.e. extent of money available for investment.
 - (ii) Dividend expectations i.e. if a large dividend is expected from a stock, the call option will be priced less, since dividend when declared and distributed, the prices will fall down. When cash market prices fall, the value of a call option also goes down.

“Intrinsic Value of an Option” And “Time Value of an Option”:

Intrinsic value and time value are two of the primary determinants of an option's price. Intrinsic value can be defined as the amount by which the strike price of an option is in-the-money. It is actually the portion of an option's price that is not lost due to the passage of time. The following equations will allow you to calculate the intrinsic value of call and put options:

- **Call Options:** $\text{Intrinsic value} = \text{Underlying Stock's Current Price} - \text{Call Strike Price}$
 $\text{Time Value} = \text{Call Premium} - \text{Intrinsic Value}$
- **Put Options:** $\text{Intrinsic value} = \text{Put Strike Price} - \text{Underlying Stock's Current Price}$
 $\text{Time Value} = \text{Put Premium} - \text{Intrinsic Value}$

ATM and OTM options don't have any intrinsic value because they do not have any real value. You are simply buying time value, which decreases as an option approaches expiration. The intrinsic value of an option is not dependent on the time left until expiration. It is simply an option's minimum value; it tells you the minimum amount an option is worth. Time value is the amount by which the price of an option exceeds its intrinsic value. Also referred to as extrinsic value, time value decays over time. In other words, the time value of an option is directly related to how much time an option has until expiration. The more time an option has until expiration, the greater the option's chance of ending up in-the-money. Time value has a snowball effect. If you have ever bought options, you may have noticed that at a certain point close to expiration, the market seems to stop moving anywhere. That's because option prices are exponential-the closer you get to expiration, the more money you're going to lose if the market doesn't move. On the expiration day, all an option is worth is its intrinsic value. It's either in-the-money, or it isn't.

Example: Let's use the table below to calculate the intrinsic value and time value of a few call options.

PRICE OF IBM = 106			
CALL STRIKE PRICE	JAN	APRIL	JULY
75	6	3 /87	8
80	2	3	7/84
85	3/8	19/16	2

If the current market price of IBM is 106, use the table to calculate the intrinsic value and time value of a few call option premiums.



1. Strike Price = 75

Intrinsic value = Underlying price - Strike price = $\$81 - \$75 = \$6$

Time value = Call premium - Intrinsic value = $\$7 - \$6 = \$1$

2. Strike Price = 80

Intrinsic value = Underlying price - Strike price = $\$81 - \$80 = \$1$

Time value = Call premium - Intrinsic value = $\$3 \frac{7}{8} - \$1 = \$2 \frac{7}{8}$

3. Strike Price = 85

Intrinsic value = Underlying price - Strike price = $\$81 - \$85 = -\$4 = \text{Zero Intrinsic Value}$

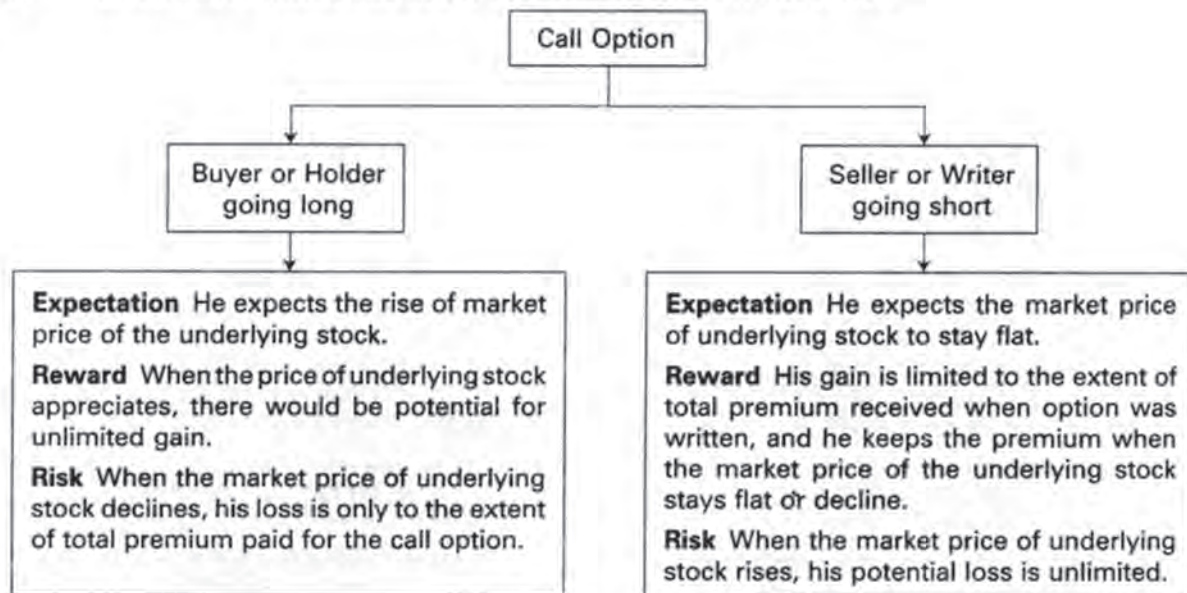
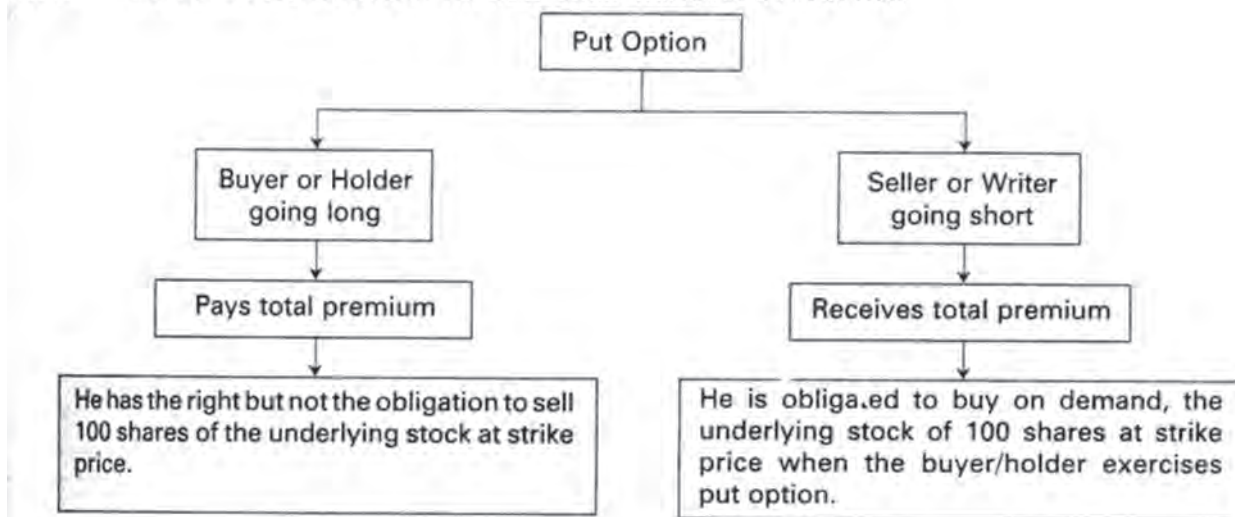
Time value = Call premium - Intrinsic value = $\$1 \frac{9}{16} - \$0 = \$1 \frac{9}{16} = \text{All Time Value}$

The intrinsic value of an option is the same regardless of how much time is left until expiration. However, since theoretically an option with 3 months till expiration has a better chance of ending up in-the-money than an option expiring in the present month, it is worth more because of the time value component. That's why an OTM option consists of nothing but time value and the more out-of-the-money an option is, the less it costs (i.e. OTM options are cheap, and get even cheaper further out). To many traders, this looks good because of the inexpensive price one has to lay out in order to buy such an option. However, the probability that an extremely OTM option will turn profitable is really quite slim. The following table helps to demonstrate the chance an option has of turning a profit by expiration.

PRICE OF IBM = 106				
STRIKE	JAN	Intrinsic	Value Time	Value
65	17	16	1	
70	13	11	2	
75	10	6	4	
80	6	1	5	
85	3	0	3	

With the price of IBM at 81, a January 85 call would cost \$3. The breakeven of a long call is equal to the strike price plus the option premium. In this case, IBM would have to be at 83 in order for the trade to breakeven ($80 + 3 = 83$). If you were to buy a January 65 call and pay \$17 for it, IBM would only have to be at \$82 in order to break even ($65 + 17 = 82$). As you can see, the further out an OTM option is, the less chance it has of turning a profit.

The deeper in-the-money an option is, the less time value and more intrinsic value it has. That's because the option has more real value and you pay less for time. Therefore, the option moves more like the underlying asset. This very important concept helps to describe the delta of an option. Understanding delta is the key to creating delta neutral strategies, one of the main approaches to non-directional Optionetics trading. One of the reasons it's important to know the minimum value of an option is to confirm how much real value and how much time value you are paying for in a premium. Since you can exercise an American style call or put anytime you want, its price should not be less than its intrinsic value. If an option's price is less than its exercise value, an investor could buy the call and exercise it, making a guaranteed arbitrage profit before commissions.

FIGURE EXPECTATION, REWARD AND RISK OF BUYER AND WRITER OF A CALL OPTION**FIGURE** RIGHTS AND OBLIGATIONS OF THE HOLDER AND WRITER OF A PUT OPTION**Covered options and Naked options:**

Covered Option: It is an option that is combined with an offsetting position in the underlying stock. Covered Option implies that, in case of Call Options, the Seller has the underlying stock in their possession, which can be transferred at the time of expiry, in case of Put Option, the Seller has sold the shares in the Cash Market.

(a) Covered Calls:

- Here the Seller / Writer of a Call Option owns the underlying stock.
- If the option is exercised by the Option Holder, the Seller would simply deliver the stock he already owns, and receives the sale price of the stock equal to the Strike Price.



(b) Covered Puts:

- Here the Seller / Writer of a Put Option has sold the stock in the Cash Market (obtained under Stock Lending Scheme or his own stock)
- If the option is exercised by the Option Holder, the seller would buy the stock and at the Exercise Price, and delivers it back to the person from whom he had borrowed the Stock under Stock Lending Scheme. If he had sold his own stock earlier, his portfolio would once again include the stock bought under the Put Option.

Naked Options: It is an option that is not combined with an offsetting position in the underlying stock. When the investor (writer of a Call and writer of a Put), does not have any stock in his hand or is not short (sell position) in the cash market, at the time of entering into options contract, it is called Uncovered Options.

(a) Uncovered Calls:

- Here the Seller / Writer of the Call Option, does not own the underlying stock.
- If the price of the underlying asset rises, the Call Writer has no protection, and would be required to buy in the open market, and deliver the asset to the Option Holder.
- If the Call Writer does not own the stock, and the option is exercised, the potential loss on his head is unlimited.

(b) Uncovered Puts:

- Here the Writer / Seller of the Put Option, does not sell the underlying asset in the Cash Market (either his own stock or borrowed under Stock Lending).
- If the price of the underlying asset falls, the Put Writer will not have any protection but to buy the stock at a very high price.

Spread strategy- Types of spread strategies:

In options trading, an option spread is created by the simultaneous purchase and sale of options of the same class on the same underlying security but with different strike prices and/or expiration dates.

Any spread that is constructed using calls can be referred to as a call spread. Similarly, put spreads are spreads created using put options.

Option buyers can consider using spreads to reduce the net cost of entering a trade. Naked option sellers can use spreads instead to lower margin requirements so as to free up buying power while simultaneously putting a cap on the maximum loss potential.

Vertical, Horizontal & Diagonal Spreads

The three basic classes of spreads are the vertical spread, the horizontal spread and the diagonal spread. They are categorized by the relationships between the strike price and expiration dates of the options involved.

Vertical spreads are constructed using options of the same class, same underlying security, same expiration month, but at different strike prices.

Horizontal or calendar spreads are constructed using options of the same underlying security, same strike prices but with different expiration dates.

Diagonal spreads are created using options of the same underlying security but different strike prices and expiration dates.

Bull Spread- its variants:

Bull Spread is the act of buying and selling options with different strike prices with the same expiry dates. Call Option purchased has a Lower Exercise Price than Call Option written. Similarly, put Option Purchased has a Higher Exercise Price than Put Option sold.

Basis:

- (a) Investor expects that the price of the underlying asset will rise, i.e. outlook is bullish.
- (b) Investor does not want to take undue risks on such expectation.

Types: There two types of Bull Spreads, Bull Call Spread and Bull Put Spread

Areas	Bull Call Spread	Bull Put Spread
Situation	Buy and Write a Call Option, with different exercise prices, but same expiry date.	Buy and Write a Put Option, with different Exercise Prices, but same expiry date.
Condition	Exercise Price of Call Option bought is LOWER than Exercise Price of Call Option sold.	Exercise Price of Put Option bought is HIGHER than Exercise Price of Put Option sold.
Maximum Profit	Ability to make Profit is limited to the difference between the Exercise Prices, and difference between the Option Premium.	Maximum Gain is limited to difference between the premium collected and paid.
Maximum Loss	Loss is limited to difference between the premium paid and collected.	Maximum Loss is limited to the difference between the Exercise Prices, and difference between the Option Premium.

Bear Spread and its variants- When will an investor choose to enter into a Bear Spread:

Bull Spread is the act of buying and selling options with different strike prices with the same expiry dates. Call Option purchased has a higher Exercise Price than Call Option written. Similarly, Put Option Purchased has a lower exercise price than Put Option sold.

Condition Prevalent and Outlook:

- (a) Investor expects that the price of the underlying asset will fall i.e. outlook is bearish.
- (b) Investor does not want to take undue risks on such expectation, by entering into sale contracts.

Types: There two types of Bear Spreads, Bear Call Spread and Bear Put Spread —

Areas	Bear Call Spread	Bear Put Spread
Situation	Buy and Write a Call Option, with different exercise prices, but same expiry date.	Buy and Write a Put Option, with different Exercise Prices, but same expiry date.
Condition	Exercise Price of Call Option bought is HIGHER than Exercise Price of Call Option sold.	Exercise Price of Put Option bought is LOW-ER than Exercise Price of Put Option sold.
Maximum Profit	Maximum Gain is limited to difference between the premium collected and paid.	Ability to make Profit is limited to the difference between the Exercise Prices, and difference between the Option Premium.
Maximum Loss	Maximum Loss is limited to the difference between the Exercise Prices, and difference between the Option Premium.	Loss is limited to difference between the premium paid and collected.

Note: Both Bull Spread and Bear Spread are similar to the extent of act of buying and writing an option for different strike prices. However, the difference lies in the exercise price of options bought and sold. In Bull Call Spread, Options bought has a lower exercise price. In a Bear Call Spread, Options sold has a higher exercise price. Likewise for other variants of Bull Spread and Bear Spread



Butterfly Spread

Butterfly Spread is an option strategy which combines a Bull Spread and Bear Spread and involves three different strike prices.

Butterfly spread is taken up if investors are of the view that the underlying security is not highly volatile and there is not going to be a substantial rise or fall in its prices.

Features:

- (a) **Risk:** Risk is limited.
- (b) **Profit:** Profits are limited and can be realised if the stock prices closes at expiry date, at the strike price of the written options.
- (c) **Costs:** Commission Costs are high.
- (d) **Strike Prices:**
 - It involves three Strike Prices wherein 2 positions are taken in one strike price and 1 transaction each is taken up at a higher strike price and the lower strike price.
 - The lower two Strike Prices are used in the Bull Spread, and the higher Strike Price is used in the Bear Spread.

Conditions: The Three Exercise Prices should satisfy the following conditions — $(EP_1 + EP_3) \div 2 = EP_2$

Where EP_1 , EP_2 and EP_3 represent the three Exercise Prices.

Types: There are two types of Butterfly Spread viz. Long and Short Butterfly Spread

Basis	Long Butterfly Spread	Short Butterfly Spread
Strategy	It is created by Buying one option at each of the Outside Exercise Prices and Selling two options at the inside Exercise Price (EP_2).	It is created by selling one option at each of the outside Exercise Prices (EP_1 and EP_3) and buying two options at the inside Exercise Price (EP_2).
Profit	It would lead to Profit if the Price of the underlying asset remains close to the Strike Price at which the two calls were sold.	The short butterfly strategy would lead to profit if the price of the underlying asset moves far away from the exercise price at which the two calls were bought.

Box Spread (Long Box)

The box spread, or long box, is a common **arbitrage strategy** that involves buying a **bull call spread** together with the corresponding **bear put spread**, with both vertical spreads having the same strike prices and expiration dates. The long box is used when the spreads are underpriced in relation to their expiration values.

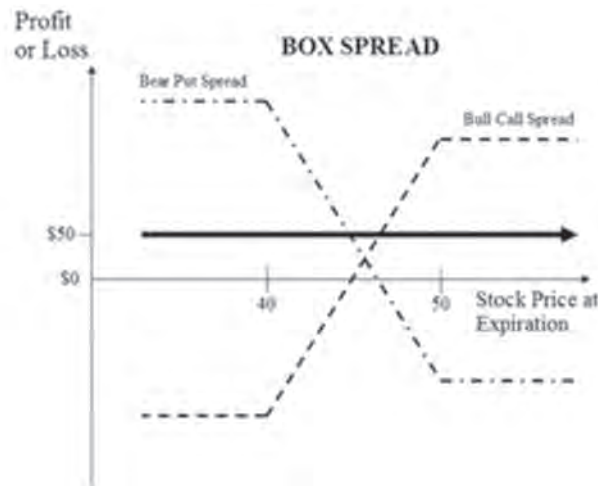
Box Spread Construction

Buy	1	ITM	Call
Sell	1	OTM	Call
Buy	1	ITM	Put
Sell	1	OTM	Put

Essentially, the arbitrage is simply buying and selling equivalent spreads and as long as the price paid for the box is significantly below the combined expiration value of the spreads, a riskless profit can be locked in immediately.

Expiration Value of Box = Higher Strike Price - Lower Strike Price

Risk-free Profit = Expiration Value of Box - Net Premium Paid



Box Spread Payoff Diagram

Example

Suppose XYZ stock is trading at \$45 in June and the following prices are available:

- JUL 40 put - \$1.50
- JUL 50 put - \$6
- JUL 40 call - \$6
- JUL 50 call - \$1

Buying the bull call spread involves purchasing the JUL 40 call for \$600 and selling the JUL 50 call for \$100. The bull call spread costs: $\$600 - \$100 = \$500$

Buying the bear put spread involves purchasing the JUL 50 put for \$600 and selling the JUL 40 put for \$150. The bear put spread costs: $\$600 - \$150 = \$450$

The total cost of the box spread is: $\$500 + \$450 = \$950$

The expiration value of the box is computed to be: $(\$50 - \$40) \times 100 = \$1000$.

Since the total cost of the box spread is less than its expiration value, a riskfree arbitrage is possible with the long box strategy. It can be observed that the expiration value of the box spread is indeed the difference between the strike prices of the options involved.

If XYZ remain unchanged at \$45, then the JUL 40 put and the JUL 50 call expire worthless while both the JUL 40 call and the JUL 50 put expires in-the-money with \$500 intrinsic value each. So the total value of the box at expiration is: $\$500 + \$500 = \$1000$.

Suppose, on expiration in July, XYZ stock rallies to \$50, then only the JUL 40 call expires in-the-money with \$1000 in intrinsic value. So the box is still worth \$1000 at expiration.



What happens when XYZ stock plummets to \$40? A similar situation happens but this time it is the JUL 50 put that expires in-the-money with \$1000 in intrinsic value while all the other options expire worthless. Still, the box is worth \$1000.

As the trader had paid only \$950 for the entire box, his profit comes to \$50.

Note: While we have covered the use of this strategy with reference to stock options, the box spread is equally applicable using ETF options, index options as well as options on futures.

The box spread is profitable when the component spreads are underpriced. Conversely, when the box is overpriced, you can sell the box for a profit. This strategy is known as a short box.

Combination Trading Strategy- its variants:

Combination is a Trading Strategy that involves taking a position in both calls and puts on the same stock.

Types:

- (a) Straddle:** Straddle involves buying a call and put with the same strike price and same expiry date.
- (b) Strangle:** Strangle involves buying a put and call with the different strike price and same expiry date.
- (c) Strips:** Strip involves selling one call and two puts with the same strike price and same expiry date.
- (d) Straps:** Strap involves selling two calls and one put with the same strike price and same expiry date.

Straddle:

In trading, there are numerous sophisticated trading strategies designed to help traders succeed regardless of whether the market moves up or down. Some of the more sophisticated strategies, such as iron condors and iron butterflies, are legendary in the world of options. They require a complex buying and selling of multiple options at various strike prices. The end result is to make sure a trader is able to profit no matter where the underlying price of the stock, currency or commodity ends up. However, one of the least sophisticated option strategies can accomplish the same market neutral objective with a lot less hassle - and it's effective. The strategy is known as a straddle. It only requires the purchase or sale of one put and one call in order to become activated. In this article, we'll take a look at different the types of straddles and the benefits and pitfalls of each.

Types of Straddles

A straddle is a strategy that is accomplished by holding an equal number of puts and calls with the same strike price and expiration dates. The following are the two types of straddle positions.

- *Long Straddle* - The long straddle is designed around the purchase of a put and a call at the exact same strike price and expiration date. The long straddle is meant to take advantage of the market price change by exploiting increased volatility. Regardless of which direction the market's price moves, a long straddle position will have you positioned to take advantage of it.
- *Short Straddle* - The short straddle requires the trader to sell both a put and a call option at the same strike price and expiration date. By selling the options, a trader is able to collect the premium as a profit. A trader only thrives when a short straddle is in a market with little or no volatility. The opportunity to profit will be based 100% on the market's lack of ability to move up or down. If the market develops a bias either way, then the total premium collected is at jeopardy.

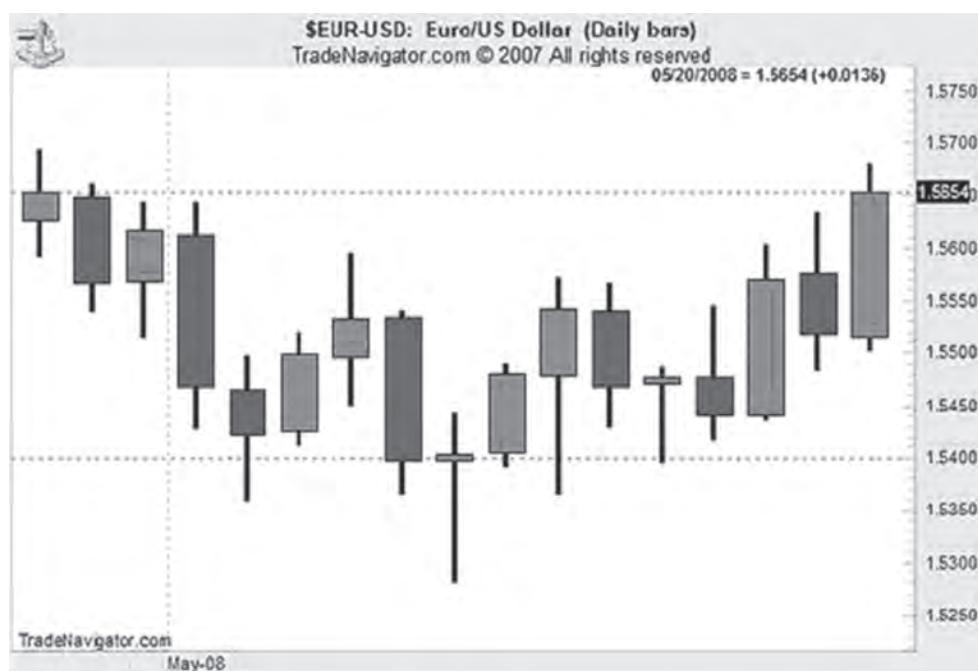
The success or failure of any straddle is based on the natural limitations that options inherently have along with the market's overall momentum.

The Long Straddle

A long straddle is specially designed to assist a trader to catch profits no matter where the market decides to go. There are three directions a market may move: up, down or sideways. When the market is moving sideways, it's difficult to know whether it will break to the upside or downside. To successfully prepare for the market's breakout, there is one of two choices available:

1. The trader can pick a side and *hopes* that the market breaks in that direction.
2. The trader can hedge his or her bets and pick both sides simultaneously. That's where the long straddle comes in.

By purchasing a put and a call, the trader is able to catch the market's move regardless of its direction. If the market moves up, the call is there; if the market moves down, the put is there. In Figure below, we look at a 17-day snapshot of the euro market. This snapshot finds the euro stuck between \$1.5660 and \$1.54.



Source: TradeNavigator.com

While the market looks like it may breakthrough the \$1.5660 price, there is no guarantee that it will. Based on this uncertainty, purchasing a straddle will allow us to catch the market if it breaks to the upside or if it heads back down to the \$1.54 level. This allows the trader to avoid any surprises.

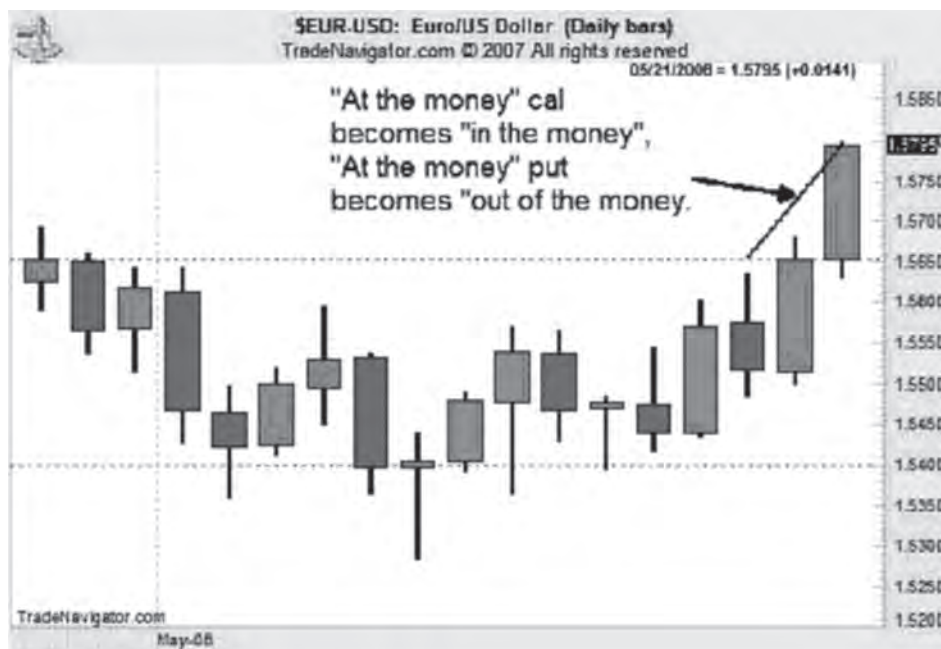
Drawbacks to the Long Straddle

The following are the three key drawbacks to the long straddle.

- Expense
- Risk of loss
- Lack of volatility

The rule of thumb when it comes to purchasing options is that in-the-money and at-the-money options are more expensive than out-of-the-money options. Each at-the-money option can be worth a few thousand dollars. So while the original intent is to be able to catch the market's move, the cost to do so may not match the amount at risk.

In Figure below we see that the market breaks to the upside, straight through \$1.5660.



Source: TradeNavigator.com

This leads us to the second problem: risk of loss. While our call at \$1.5660 has now moved in the money and increased in value in the process, the \$1.5660 put has now decreased in value because it has now moved farther out of the money. How quickly a trader can exit the losing side of straddle will have a significant impact on what the overall profitable outcome of the straddle can be. If the option losses mount quicker than the option gains or the market fails to move enough to make up for the losses, the overall trade will be a loser.

The final drawback deals with the inherent makeup of options. All options are comprised of the following two values.

- Time Value - The time value comes from how far away the option is from expiring.
- Intrinsic Value - The intrinsic value comes from the option's strike price being out, in, or at the money.

If the market lacks volatility and does not move up or down, both the put and call option will lose value every day. This will go on until the market either definitively chooses a direction or the options expire worthless.

The Short Straddle

The short straddle's strength is also its drawback. Instead of purchasing a put and a call, a put and a call are sold in order to generate income from the premiums. The thousands that were spent by the put and call buyers actually fill your account. This can be a great boon for any trader. The downside, however, is that when you sell an option you expose yourself to unlimited risk.

As long as the market does not move up or down in price, the short straddle trader is perfectly fine. The optimum profitable scenario involves the erosion of both the time value and the intrinsic value of the put and call options. In the event that the market does pick a direction, the trader not only has to pay for any losses that accrue, but he or she must also give back the premium he has collected. The only recourse that short straddle traders have is to buy back the options that they sold when the value

justifies doing so. This can occur anytime during the life cycle of a trade. If this is not done, the only choice is to hold on until expiration.

When Straddles Work Best

The option straddle works best when it meets at least one of these three criteria:

- The market is in a sideways pattern.
- There is pending news, earnings or another announcement.
- Analysts have extensive predictions on a particular announcement.

Analysts can have tremendous impact on how the market reacts before an announcement is ever made. Prior to any earnings decision or governmental announcement analysts, do their best to predict what the exact value of the announcement will be. Analysts may make estimates weeks in advance of the actual announcement, which inadvertently forces the market to move up or down. Whether the prediction is right or wrong is secondary to how the market reacts and whether your straddle will be profitable. After the actual numbers are released, the market has one of two ways to react: The analysts' prediction can add either to or decrease the momentum of the actual price once the announcement is made. In other words, it will proceed in the direction of what the analyst predicted or it will show signs of fatigue. A properly created straddle, short or long, can successfully take advantage of just this type of market scenario. The difficulty occurs in knowing when to use a short or a long straddle. This can only be determined when the market will move counter to the news and when the news will simply add to the momentum of the market's direction.

There is a constant pressure on traders to choose to buy or sell, collect premium or pay premiums, but the straddle is the great equalizer. The straddle allows a trader to let the market decide where it wants to go. The classic trading adage is "the trend is your friend". Take advantage of one of the few times that you are allowed to be in two places at once with both a put and a call.

Strangle strategy:

A strangle is an investment strategy involving the purchase or sale of particular option derivatives that allows the holder to profit based on how much the price of the underlying security moves, with relatively minimal exposure to the direction of price movement. The purchase of particular option derivatives is known as a long strangle, while the sale of the option derivatives is known as a short strangle.

The long strangle, also known as buy strangle or simply "strangle", is a neutral strategy in options trading that involve the simultaneous buying of a slightly out-of-the-money put and a slightly out-of-the-money call of the same underlying stock and expiration date.

Long Strangle Construction

Buy	1	OTM	Call
Buy	1	OTM	Put

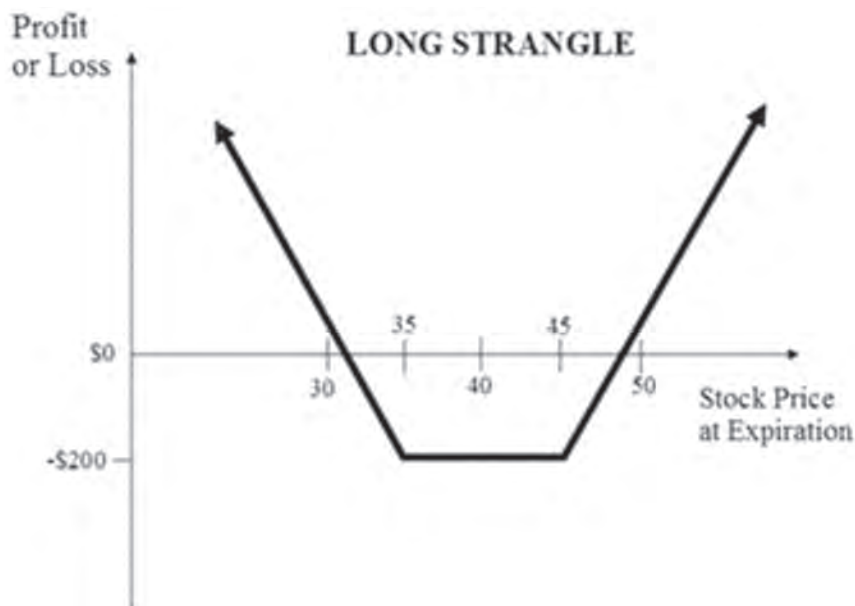
The long options strangle is an unlimited profit, limited risk strategy that is taken when the options trader thinks that the underlying stock will experience significant volatility in the near term. Long strangles are debit spreads as a net debit is taken to enter the trade.

Large gains for the long strangle option strategy is attainable when the underlying stock price makes a very strong move either upwards or downwards at expiration.

The formula for calculating profit is given below:

- Maximum Profit = Unlimited
- Profit Achieved When Price of Underlying > Strike Price of Long Call + Net Premium Paid OR Price of Underlying < Strike Price of Long Put - Net Premium Paid

- Profit = Price of Underlying - Strike Price of Long Call - Net Premium Paid OR Strike Price of Long Put - Price of Underlying - Net Premium Paid



Long Strangle Payoff Diagram

Limited Risk

Maximum loss for the long strangle options strategy is hit when the underlying stock price on expiration date is trading between the strike prices of the options bought. At this price, both options expire worthless and the options trader loses the entire initial debit taken to enter the trade.

The formula for calculating maximum loss is given below:

- Max Loss = Net Premium Paid + Commissions Paid
- Max Loss Occurs When Price of Underlying is in between Strike Price of Long Call and Strike Price of Long Put

Breakeven Point(s)

There are 2 break-even points for the long strangle position. The breakeven points can be calculated using the following formulae.

- Upper Breakeven Point = Strike Price of Long Call + Net Premium Paid
- Lower Breakeven Point = Strike Price of Long Put - Net Premium Paid

Example

Suppose XYZ stock is trading at \$40 in June. An options trader executes a long strangle by buying a JUL 35 put for \$100 and a JUL 45 call for \$100. The net debit taken to enter the trade is \$200, which is also his maximum possible loss.

If XYZ stock rallies and is trading at \$50 on expiration in July, the JUL 35 put will expire worthless but the JUL 45 call expires in the money and has an intrinsic value of \$500. Subtracting the initial debit of \$200, the options trader's profit comes to \$300.

On expiration in July, if XYZ stock is still trading at \$40, both the JUL 35 put and the JUL 45 call expire worthless and the options trader suffers a maximum loss which is equal to the initial debit of \$200 taken to enter the trade.

Note: While we have covered the use of this strategy with reference to stock options, the long strangle is equally applicable using ETF options, index options as well as options on futures.

The converse strategy to the long strangle is the short strangle. Short strangle spreads are used when little movement is expected of the underlying stock price.

Strip

The strip is a modified, more bearish version of the common straddle. It involves buying a number of at-the-money calls and twice the number of puts of the same underlying stock, striking price and expiration date.

Strip Construction

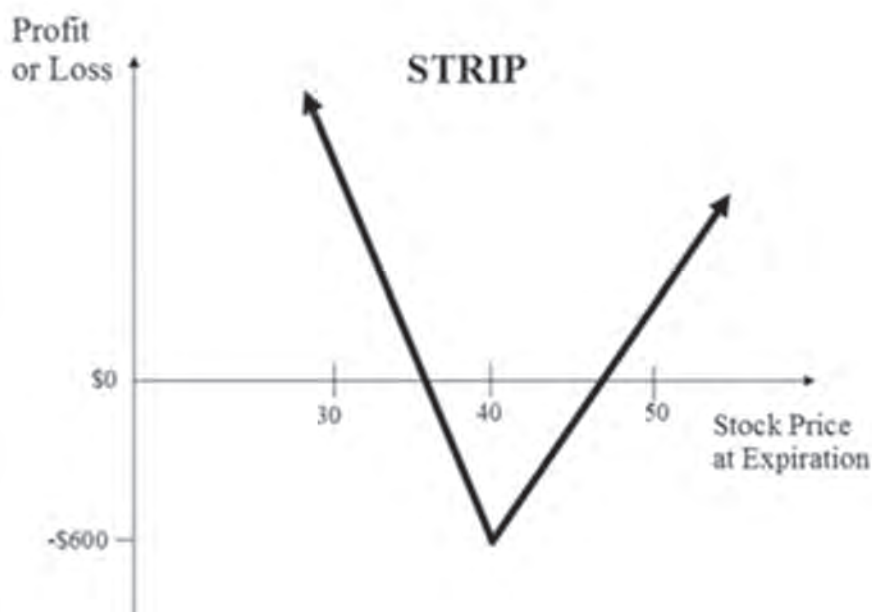
Buy	1	ATM	Call
Buy	2	ATM	Puts

Strips are unlimited profit, limited risk options trading strategies that are used when the options trader thinks that the underlying stock price will experience significant volatility in the near term and is more likely to plunge downwards instead of rallying.

Large profit is attainable with the strip strategy when the underlying stock price makes a strong move either upwards or downwards at expiration, with greater gains to be made with a downward move.

The formula for calculating profit is given below:

- Maximum Profit = Unlimited
- Profit Achieved When Price of Underlying > Strike Price of Calls/Puts + Net Premium Paid OR Price of Underlying < Strike Price of Calls/Puts - (Net Premium Paid/2)
- Profit = Price of Underlying - Strike Price of Calls - Net Premium Paid OR 2 x (Strike Price of Puts - Price of Underlying) - Net Premium Paid



Strip Payoff Diagram



Limited Risk

Maximum loss for the strip occurs when the underlying stock price on expiration date is trading at the strike price of the call and put options purchased. At this price, all the options expire worthless and the options trader loses the entire initial debit taken to enter the trade.

The formula for calculating maximum loss is given below:

- $\text{Max Loss} = \text{Net Premium Paid} + \text{Commissions Paid}$
- $\text{Max Loss Occurs When Price of Underlying} = \text{Strike Price of Calls/Puts}$

Breakeven Point(s)

There are 2 break-even points for the strip position. The breakeven points can be calculated using the following formulae.

- $\text{Upper Breakeven Point} = \text{Strike Price of Calls/Puts} + \text{Net Premium Paid}$
- $\text{Lower Breakeven Point} = \text{Strike Price of Calls/Puts} - (\text{Net Premium Paid}/2)$

Example

Suppose XYZ stock is trading at \$40 in June. An options trader implements a strip by buying two JUL 40 puts for \$400 and a JUL 40 call for \$200. The net debit taken to enter the trade is \$600, which is also his maximum possible loss.

If XYZ stock is trading at \$50 on expiration in July, the JUL 40 puts will expire worthless but the JUL 40 call expires in the money and has an intrinsic value of \$1000. Subtracting the initial debit of \$600, the strip's profit comes to \$400.

If XYZ stock price plunges to \$30 on expiration in July, the JUL 40 call will expire worthless but the two JUL 40 puts will expire in-the-money and possess intrinsic value of \$1000 each. Subtracting the initial debit of \$600, the strip's profit comes to \$1400.

On expiration in July, if XYZ stock is still trading at \$40, both the JUL 40 puts and the JUL 40 call expire worthless and the strip suffers its maximum loss which is equal to the initial debit of \$600 taken to enter the trade.

Strap

The strap is a modified, more bullish version of the common straddle. It involves buying a number of at-the-money puts and twice the number of calls of the same underlying stock, striking price and expiration date.

Strap Construction

Buy	2	ATM	Calls
Buy	1	ATM	Put

Straps are unlimited profit, limited risk options trading strategies that are used when the options trader thinks that the underlying stock price will experience significant volatility in the near term and is more likely to rally upwards instead of plunging downwards.

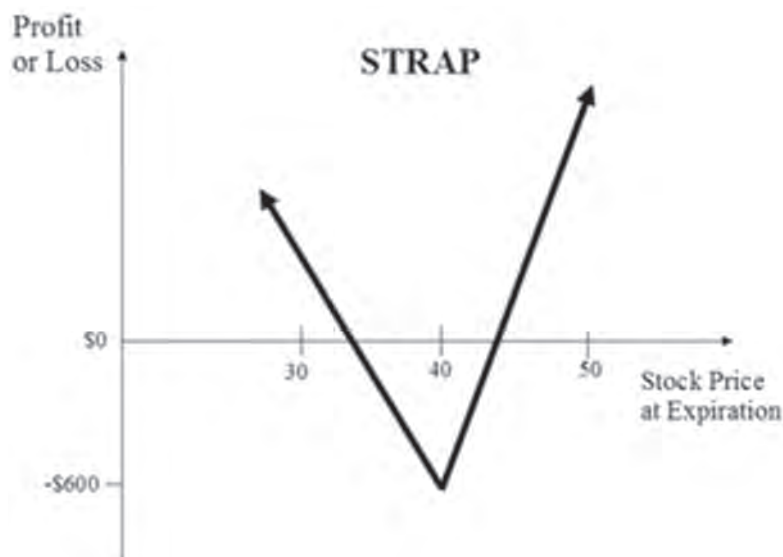
Unlimited Profit Potential

Large profit is attainable with the strap strategy when the underlying stock price makes a strong move either upwards or downwards at expiration, with greater gains to be made with an upward move.

The formula for calculating profit is given below:

- $\text{Maximum Profit} = \text{Unlimited}$

- Profit Achieved When Price of Underlying > Strike Price of Calls/Puts + (Net Premium Paid/2) OR Price of Underlying < Strike Price of Calls/Puts - Net Premium Paid
- Profit = 2 x (Price of Underlying - Strike Price of Calls) - Net Premium Paid OR Strike Price of Puts - Price of Underlying - Net Premium Paid



Strap Payoff Diagram

Limited Risk

Maximum loss for the strap occurs when the underlying stock price on expiration date is trading at the strike price of the call and put options purchased. At this price, all the options expire worthless and the options trader loses the entire initial debit taken to enter the trade.

The formula for calculating maximum loss is given below:

- Max Loss = Net Premium Paid + Commissions Paid
- Max Loss Occurs When Price of Underlying = Strike Price of Calls/Puts

Breakeven Point(s)

There are 2 break-even points for the strap position. The breakeven points can be calculated using the following formulae.

- Upper Breakeven Point = Strike Price of Calls/Puts + (Net Premium Paid/2)
- Lower Breakeven Point = Strike Price of Calls/Puts - Net Premium Paid

Example

Suppose XYZ stock is trading at \$40 in June. An options trader implements a strap by buying two JUL 40 calls for \$400 and a JUL 40 put for \$200. The net debit taken to enter the trade is \$600, which is also his maximum possible loss.

If XYZ stock price plunges to \$30 on expiration in July, the JUL 40 calls will expire worthless but the JUL 40 put will expire in-the-money and possess intrinsic value of \$1000. Subtracting the initial debit of \$600, the strap's profit comes to \$400.

If XYZ stock is trading at \$50 on expiration in July, the JUL 40 put will expire worthless but the two JUL 40 calls expires in the money and has an intrinsic value of \$1000 each. Subtracting the initial debit of \$600, the strap's profit comes to \$1400.



On expiration in July, if XYZ stock is still trading at \$40, both the JUL 40 put and the JUL 40 calls expire worthless and the strap suffers its maximum loss which is equal to the initial debit of \$600 taken to enter the trade.

Put-Call Parity Theory:

Put-Call Parity is the relationship between the price of an European Call Option and the price of the European Put Option, when they have the same strike price and maturity date, namely that a portfolio of long a call option and short a put option is equivalent to (and hence has the same value as) a single forward contract at this strike price and expiry. This is because if the price at expiry is above the strike price, the call will be exercised, while if it is below, the put will be exercised, and thus in either case one unit of the asset will be purchased for the strike price, exactly as in a forward contract.

The validity of this relationship requires that certain assumptions be satisfied; these are specified and the relationship derived below. In practice transaction costs and financing costs (leverage) mean this relationship will not exactly hold, but in liquid markets the relationship is close to exact.

Theory:

$$C + PV \text{ of EP} = SP + P$$

Where, C = Price of a Call Option, i.e. Call Option Premium

EP = Exercise Price

SP = Current Stock Price

P = Price of a Put Option, i.e. Put Option Premium

Significance and Application: When options are priced such that the Put-Call Parity does not hold good, then there is scope for arbitrage, by investing in risk free investments or borrowing at risk free rate.

Option Valuation

The term option valuation is used to convey two meanings :

- (i) The value of the option at the time of its maturity. It is the amount that the option buyer receives from the option writer on exercising the option
- (ii) The value of the option at the time of its writing. This is also referred to as option premium or option price. The three major methods of option valuation are as follows :
 1. Binomial Method
 2. Risk Neutral Method
 3. Black-Scholes Model

Binomial Tree approach to valuing or pricing an option:

This model assumes that the underlying asset can have only two values at the time of maturity of an option. One will be higher than the strike price and the other will be lower than the strike price.

The option premium calculated under this method provides risk-free rate of return, at either of the two prices, on the investment made by option –writer. (in case the option writer uses borrowed funds, the return at risk free rate will be provided on borrowed funds.)

Factors Considered: Following are the factors considered in valuing / pricing an option under the Binomial Tree Approach —

- (a) Current Spot Price of the underlying asset,
- (b) Exercise Price under the Options Contract,
- (c) Set of Expected Future Spot Prices — one above the Exercise Price and one below the Exercise Price,
- (d) Risk Free Rate of Return,

(e) Period to Expiry.

Value of an Option: (a) Formula Method:

$$= \frac{C_u \left[\frac{f-d}{u-d} \right] + C_d \left[\frac{u-f}{u-d} \right]}{f}$$

= Present Value of

$$C_u \times \left[\frac{f-d}{u-d} \right] + C_d \times \left[\frac{u-f}{u-d} \right]$$

= Present Value of $\left[\left\{ \text{Value of option at Upper Price} \times \text{Probability of Upper Price} \right\} + \left\{ \text{Value of option at Lower Price} \times \text{Probability of Lower Price} \right\} \right]$

Where,

Notation	Factor
SP_0	Spot Price
EP	Exercise Price
FP_1	Expected Future Spot Price — Lower Limit [FP_1]
FP_2	Expected Future Spot Price — Higher Limit [FP_2]
C_d	Value of Option at Lower Limit [Call = 0, Put = $EP - FP_1$]

Notation	Factor
C_u	Value of Call at Upper Limit [Call = $FP_2 - EP$, Put = 0]
d	Extent of Lower Limit of Future Spot Price [FP_1] on Current Price [SP_0] [$FP_1 \div SP_0$]
u	Extent of Upper Limit of Future Spot Price [FP_2] on Current Price [SP_0] [$FP_2 \div SP_0$]
r	Risk Free Rate of Return
t	Tenor of Options Contract [in Years]
f	Future Value Factor [Continuous Compounding Factor] = e^{rt}

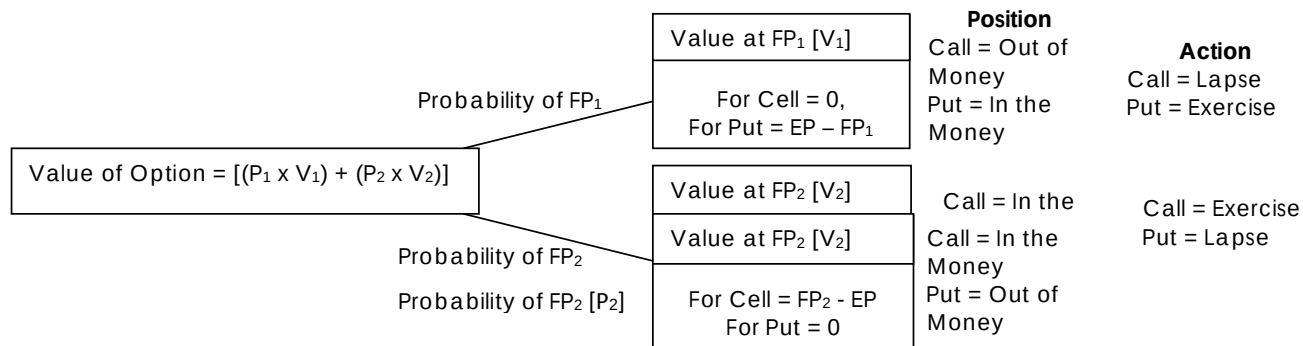
(b) Delta Method:

Value of Call = Options Delta X [$SP_0 - (FP_1 \times e^{-rt})$]

$$= \frac{C_u - C_d}{FP_2 - FP_1} \times [SP_0 - (FP_1 \times e^{-rt})]$$



Binomial Tree:



Value of Option = Present Value of $[(P_1 \times V_1) + (P_2 \times V_2)]$

$$= e^{-rt} \times [(P_1 \times V_1) + (P_2 \times V_2)]$$

Risk Neutral Valuation approach to pricing options :

This method provides an alternative way of obtaining same results as those of Binomial Model. The following steps are required :

Step	Description
1	Identification of Probability: Ascertain the probability of upper limit and lower limit of Future Spot Price (FP), by equating the present value of expected Future Spot Price to the Current Spot Price (S_0).
2	Nominal Value of an Option: Apply the probabilities so identified on the value of the option at the two Future Spot Prices, to get the expected value of option on expiry.
3	Present Value: Discount the expected value of option (nominal value) to present value to identify the value of an option.

Basis for Risk Neutral Valuation Approach: Valuation of options is based on arbitrage possibilities and is therefore independent of risk preferences. Therefore, value of options should be the same for any set of risk preferences.

Factors Considered:

- Current Spot Price (SP_0),
- Expected Future Spot Prices (FP_1 and FP_2),
- Exercise Price (EP),
- Risk Free Rate of Return, and
- Period to Expiry.

Approach:

- Identification of Probability of Lower Price Limit (P_1) or Upper Price Limit (P_2) by solving the following equation —

$$\begin{aligned}
 SP_0 &= \text{Present Value of } [P_1 \times FP_1 + P_2 \times FP_2], \text{ where } P_1 + P_2 = 1 \\
 &= e^{-rt} \times [P_1 \times FP_1 + P_2 \times FP_2] \\
 e^{rt} \times SP_0 &= P_1 \times FP_1 + P_2 \times FP_2
 \end{aligned}$$

(b) Value of Option = PV of [(Value at $FP_1 \times P_1$) + (Value at $FP_2 \times P_2$)]

Note: Value of Option, under Binomial Model and the Risk Neutral Valuation Model will be the same.

Black and Scholes Model of option valuation:

Pricing Model: Under the BSM Model of Option Pricing, value of an option is the difference between the expected benefit from acquiring a stock and the present value of the exercise price.

Development of BSM Model:

(a) Stage I: Value of Option of a Riskless Stock

Basic Formula: [On the assumption that the stock is virtually riskless]

- (i) Value of Call on Expiry = Pay Off on Expiry = Spot Price on Expiry Date **Less** Exercise Price, i.e. $[FP - EP]$ [Assumption $\rightarrow$ Stock is virtually risk free]
- (ii) Value of Call Today = Present Value of $(FP - EP)$ or $e^{-rt} (FP - EP)$
- (iii) Future Spot Price (FP) = Future Value of Current Spot Price (compounded continuously at Risk Free Rate) = $SP_0 \times e^{rt}$

(iv) Value of Call Today:

$$\begin{aligned}
 \text{Call} &= e^{-rt} (FP - EP) \\
 \Rightarrow &= e^{-rt} (SP_0 \times e^{rt} - EP) \\
 &= (e^{-rt} \times SP_0 \times e^{rt}) - (e^{-rt} \times EP) \\
 &= SP_0 - (e^{-rt} \times EP), \text{ i.e. Current Stock Price Less PV of Exercise Price}
 \end{aligned}$$

(b) Stage II: Introduction of Probability Factor and Risk Factors:

To the above basic formula (containing two components), probabilities are assigned as follows

- For SP_0 = Probability that the stock price will move at the risk free rate, i.e. Future Spot Price is a factor of Current Stock Price and Risk Free Rate of Return, or the extent to which Risk Free Rate affects the Future Spot Price.
- For Present Value of Exercise Price = Probability that the option will be exercised due to uncertainty in the stock price movement.

Modified Formula: $P_1 \times SP_0$ **Less** $P_2 \times EP \times e^{-rt}$

Where, P_1 = Probability of Stock Price moving in accordance with Risk Free Rate.

P_2 = Probability that the option will be exercised and strike price paid.

(c) Stage III: Calculation of Probability Factor:

P_1 and P_2 Standard Normal Distribution Table Value of a variable which is a function of time period of option, i.e. period to expiry (t), risk associated with the stock return (σ), current Stock Price (SP_0) and Exercise Price (EP).

P_1 is denoted by $N(D_1)$ and P_2 is denoted by $N(D_2)$

Modified Formula: $N(D_1) \times SP_0$ **Less** $N(D_2) \times EP \times e^{-rt}$

(d) Computation of Variables for Probability:

- (i) DI (Variable Attached with Movement in Stock Price)

$$= \frac{\ln(SP_0/EP) + [(r + 0.5\sigma^2) \times t]}{\sigma\sqrt{t}}$$



(ii) D2 (Variable Attached with Exercise of Option)

$$= \frac{\ln(SP_0/EP) + [(r + 0.50\sigma^2) \times t]}{\sigma\sqrt{t}} ; \text{ or}$$

$$= D_1 - \sigma\sqrt{t}$$

Note: "Ln" refers to Natural Logarithm.

Assumptions of the Black and Scholes Model:

- (a) Rates of return on a share / stock are lognormally distributed.
- (b) Value of the share and the risk free rate are constant during the life of the option.
- (c) Market is efficient and there are no transaction costs and taxes.
- (d) No dividends are paid on the share during the life of the option.
- (e) No restrictions or penalties for short selling.
- (f) Option can be exercised only on the Expiry Date (i.e. options are all European Options).

The Greeks

In options trading, you may notice the use of certain greek alphabets when describing risks associated with various positions. They are known as "the greeks" and we shall discuss the four most commonly used ones. They are delta, gamma, theta and vega.

Delta:

Delta of a Stock Option is the ratio of the change in the price of the stock option to the change in the price of the underlying stock. It measures the sensitivity of Options Price to the movement in the prices of the underlying asset.

Deltas of Call Option and Put Option:

- (a) Delta of a Call Option is always positive.
- (b) Delta of a Put Option is always negative.

Formula:

$$\text{Delta } (\Delta) = \frac{\text{Change in Option Price i.e. Option Premium}}{\text{Change in Stock Price}}$$

Example: On 01.12.2012, when the trade opens, the stock price of Amitech Castings is ₹ 240. It rises to ₹ 250 . The December 2012 Call Option on Amitech Castings started at ₹ 20. It moved to ₹ 23.

Delta of Call Options of Amitech Castings is computed as under —

$$\text{Delta } (\Delta) = \frac{\text{Close Option Price ₹23} - \text{Opening Option Price ₹20}}{\text{Closing Stock Price ₹250} - \text{Option Stock Price ₹240}} = \frac{\text{₹3.00}}{\text{₹10.00}} = 0.30$$

Application: Value of Delta is the number of units of the underlying stock which an investor should hold for each option sold in order to create a riskless hedge.

Delta Hedging:

Creating a Riskless Hedge using Options and Underlying Stock, is called Delta Hedging.

Rebalancing: Since Delta changes, the investor's position remains delta hedged (or delta neutral) for only a relatively short period. The hedge should be adjusted periodically. This is called re-balancing.

Delta Values:

Option Position is	Value of Delta
In the Money [Extreme beneficial CMP]	Almost Equal to ± 1 [Never beyond than ± 1]
At the Money	Approximately equal to ± 0.50
Out of Money [Extreme beneficial CMP]	Near to Zero.

Gamma :

The gamma of an option is defined as the rate of change of the option's delta with respect to the price of the underlying, when all else remains the same. It's the second partial derivative of the option price with respect to the underlying price. In other words, gamma is the rate at which delta will change. The delta captures the extent of change and the gamma measures the pace of the change. It is also called as **Curvature**.

Gamma is also called as the Second Derivative of an Option Premium since it measures the sensitivity of Delta, which is the first measure of sensitivity of Option's Price to Market Price of the Underlying Asset.

Evaluation based on Gamma Values:

- If Gamma is small, delta changes slowly, and re-balancing act (i.e. adjustments to keep a portfolio delta neutral) needs not be done on a frequent basis.
- If Gamma value is high, delta is highly sensitive to the price of the underlying asset. This situation requires the re-balancing to be done on a frequent basis.

Vega or Lambda:

Vega of the option measures the sensitivity of option price with respect to the volatility of the price of the underlying asset. It considers both movement in price and also decrease in period to expiry of an option. It is calculated as change in the option premium for a unit change in the volatility of the price of the underlying asset. For both call and put options, Vega lies between zero and infinity. Vega is maximum for at the money options with long term to expiration. High Vega reflects the higher chances of an option going "In-the-money" at any point in time during the currency of the contract. So options with high Vega are attractive to the option buyer Vega is positive for Option Buyer and negative for Option Seller

Theta:

Theta measures the sensitivity of the option's price with respect to its time to expiry i.e. Time Value of an Option. It measures the change of the price of the option with the passage of time. It is also referred to as the time decay of the stock or portfolio. Theta Values for both the Call and the Put Option lies between Zero and the Total Value of the Option. It will be positive or negative based on the nature of the investor (holder or writer). Value of Theta is generally measured on per day basis, and therefore, value of Theta would vary for every trading day, based on the movement in Stock Prices. When Option Contract approaches the expiry date, option tends to become less valuable. Since the Stock Price and the option price move in tandem, the value of theta remains same or uniform towards the end of the options contract.

Rho

Rho is the last and the least used Greek. Rho helps us to understand the change in option premium, which are not linked to the underlying stock movement. For instance, interest rates changes may cause a change in option premium.

Rho indicates the change in option value for a one percentage change in the interest rate.

Example: a Rho of 1.50 indicates the option's theoretical value will increase by 1.50 if the interest rate is decreased by 1%.

An increase in interest rates increases the value of calls and decreases the value of puts. A decrease in interest rates decreases the value of calls and increases the value of puts. The range of the Rho Value also depends on the position that a person holds in the Option. Long calls and short puts have positive Rho. Short calls and long puts have negative Rho.

**Illustration 27.**

Kiran, who trades in shares in the spot market, follows the rule “When prices are rising — Buy; When prices are falling — Sell”. She ensures that her portfolio is intact at the end of every three months, even if she buys or sells in between.

She is a first timer to the options market and wishes to apply the above rule in the options market, where she understands that buy equates to call option and sell equals put option. For a three-month horizon, the following information is available for 5 securities (of which Kiran holds sufficient quantities):-

Scrip	Spot Price	Outlook	Exercise Price
Greaves Cotton Ltd	₹345	Increase by 15%	₹400
NDTV	₹395	Increase by 10%	₹430
Punj Lloyd	₹260	Decrease by 5%	₹250
ITC Ltd	₹160	Increase by 5%	₹170
TCS Ltd	₹1120	Decrease by 10%	₹1000

If the expectations translates into actual, and Kiran follows her spot market rule in options market as well, how much she would have earned in the options market? You may assume that she will deal only in 100 units of scrip at a time and exercises her option, come what may.

What would have been the position if she had opted for options, not based on spot market rules, but based on option market rules i.e. Exercise Price > Expected Price = Put Option; Expected Price > Exercise Price = Call Option?

What is the lesson to be learnt? Ignore transaction costs, time value of money and cost of options.

Solution:**Choice of Option — Spot Market Rules****(a) Choice of Option and Expected Price**

Scrip	Expectation for the next 3 Months	Option Chosen	Spot Price	Expected Price after 3 Months
Greaves	Increase by 15%	Call	₹345	₹345 + 15% = ₹397
NDTV	Increase by 10%	Call	₹395	₹395 + 10% = ₹434
Punj Lloyd	Decrease by 5%	Put	₹260	₹260-5% = ₹247
ITC Ltd	Increase by 5%	Call	₹160	₹160 + 5% = ₹168
TCS Ltd	Decrease by 10%	Put	₹1,120	₹1,120-10% = ₹1,008

(b) Gain / Loss Statement on Options Contracts

Scrip	3- Month' Spot Price	Strike Price	Option Chosen	Action	No. of Scrips	Gain/Loss[Sale Value less Buy cost]
Greaves	₹397	₹400	Call	Buy under option at Strike Price. Sell spot at Spot Price.	100	Loss (₹300) [100 x (₹397 - ₹400)]

NDTV	₹434	₹430	Call	Buy under option at Strike Price. Sell spot at Spot Price.	100	Gain ₹400 [100 x (₹434 - ₹430)]
Punj Lloyd	₹247	₹250	Put	Buy spot at Spot Price. Sell under option at Strike Price.	100	Gain ₹300 [100 x (₹250 - ₹247)]
ITC Ltd	₹168	₹170	Call	Buy under option at Strike Price. Sell spot at Spot Price.	100	Loss (₹200) [100 x (₹168 - ₹170)]
TCS Ltd	₹1,008	₹1,000	Put	Buy spot at Spot Price. Sell under option at Strike Price.	100	Loss (₹800) [100 x (₹1000 - ₹1008)]
						Loss (₹600)

Note: If Devi had chosen not to exercise the option for loss inflicting scrips, she would have earned ₹1300.

2. Choice of Option — Option Market Rules

(a) Choice of Option and Expected Price

Scrip	Spot Price	Expectation for the next 3 Months	Expected Price after 3 Months [EP]	Strike Price [SP]	EPvs.SP [Higher]	Option Chosen
Greaves	₹345	Increase by 15%	₹340 + 15% = ₹397	₹400	SP	Put
NDTV	₹395	Increase by 10%	₹400 + 10% = ₹434	₹430	EP	Call
Punj Lloyd	₹260	Decrease by 5%	₹260 - 5% = ₹247	₹250	SP	Put
ITC Ltd	₹160	Increase by 5%	₹160 + 5% = ₹168	₹170	SP	Put
TCS Ltd	₹1,120	Decrease by 10%	₹1,120 - 10% = ₹1,008	₹1,000	EP	Call

(b) Gain / Loss Statement on Options Contracts

Scrip	3-Months' Spot Price	Strike Price	Option Chosen	Action	No. of Scrips	Gain / Loss [Sale Value Less Buy Cost]
Greaves	₹397	₹400	Put	Buy spot at Spot Price. Sell under option at Strike Price.	100	₹300 [100 x (₹400 - ₹391)]
NDTV	₹434	₹430	Call	Buy under option at Strike Price. Sell spot at Spot Price.	100	₹400 [100 x (₹440 - ₹430)]
Punj Lloyd	₹247	₹250	Put	Buy spot at Spot Price. Sell under option at Strike Price.	100	₹300 [100 x (₹250 - ₹247)]



ITC Ltd	₹168	₹170	Put	Buy spot at Spot Price. Sell under option at Strike Price.	100	₹200 [100 x (₹170 - ₹168)]
TCS Ltd	₹1,008	₹1,000	Call	Buy under option at Strike Price. Sell spot at Spot Price.	100	₹800 [100 x (₹1008 - ₹1000)]
						Gain ₹2,000

Inference:

- In the cash market, movement in the prices is relevant. In the options market, the expected price on the date of expiry and the strike price are relevant.
- Gain or loss under options is based on the Exercise Price and the spot price on the date of expiry and not on the basis of direction of movement in strike price.
- In a rising market, buying a Call Option may still not yield return if the expected spot price is less than the exercise price. Call options and put options can be bought both under a bearish market as well as a bullish market.

Illustration 28.

Sundar Ramalingam had entered into 5 Put Options and 5 Call Options in different securities, the particulars of which are given below, along with their exercise price and actual market price on the date of exercise —

Call Options			Put Options		
Security	Exercise Price	Actual Market Price	Security	Exercise Price	Actual Market Price
P	₹370	₹376	A	₹118	₹122
Q	₹450	₹444	B	₹758	₹758
R	₹1790	₹1700	C	₹350	₹340
S	₹135	₹140	D	₹65	₹69
T	₹953	₹953	E	₹230	₹220

What is his position on the date of exercise and what would he do?

Solution:

1. Put Options [Right to Sell]

Security	Exercise Price (EP)	Actual Market Price (AMP)	AMP vs. EP [Higher]	Position	Action
A	₹118	₹122	AMP	Out of Money	Lapse
B	₹758	₹758	Equal	At the Money	No Action
C	₹350	₹340	EP	In the Money	Exercise
D	₹65	₹69	AMP	Out of Money	Lapse
E	₹230	₹220	EP	In the Money	Exercise

2. Call Option [Right to Buy]

Security	Exercise Price (EP)	Actual Market Price (AMP)	AMP vs. EP [Higher]	Position	Action
P	₹370	₹376	AMP	In the Money	Exercise
Q	₹450	₹444	EP	Out of Money	Lapse
R	₹1790	₹1700	EP	Out of Money	Lapse
S	₹135	₹140	AMP	In the Money	Exercise
T	₹953	₹953	Equal	At the Money	No Action

Illustration 29.

Given the following:

Strike price	₹200
Current stock price	₹185
Risk free rate of interest	5 % p.a

- (a) Calculate the theoretical minimum price of a European put option after 6 months.
 (b) If European put option price is ₹5 , then how can an arbitrageur make profit.

Solution:**1. Computation of Theoretical Minimum Price**

Particulars	Value
Exercise price	₹200
Current Stock Price	₹185
Risk Free Rate of Return (r)	5% or 0.05
Time (in years)	$6 \div 12 = 0.5$
Theoretical Minimum Price	$= \text{Present Value of Exercise Price} - \text{Current Stock Price}$ $= 200 \times e^{-rt} - 185$ $= 200 + e^{0.05 \times 0.5} - 185 = (200 \div 1.02532) - 185$ $= 195.0611 - 185 = 10.0611$

Inference: Since the Value of Put Option is more than the price of the Put Option, it is under priced and the recommended action will be to Buy the Put Option.

2. Cash Flows to make Profit for the Arbitrageur Activity Flow:

1. Arbitrageur can borrow the amount required to buy the Put Option and Stock at the rate of 5% p.a. for 6 months.
2. Buy Put Option.
3. Take the opposite position and buy stock at spot price.
4. At the end of six months, exercise the Put option and realise the receipts.
5. Pay the amount of Borrowing together with Interest.



Particulars	Time	₹
1. Borrow at the rate of 5% for 6 months [185+5]	T_0	190
2. Buy Put Option	T_0	(5)
3. Buy Stock at Spot Price	T_0	(185)
4. Exercise the Put Option and realise the Sale Proceeds	T_1	200
5. Repay the amount of Borrowing together with Interest $[190 e^{0.05 \times 0.5}] = [190 \times 1.02532]$	T_1	194.81
6. Net Gain made [(4) - (5)]	T_1	5.19

Note: The amount of gain is the minimum amount and will increase with every increase in Spot Price as on the Exercise Date.

Illustration 30.

Stock of Swarup Air Cargo Ltd is currently quoted at ₹112. Ascertain the Time Value and Intrinsic Value of Option from the following particulars available in relation to derivatives market —

Put Options		
Situation	Exercise Price	Premium
A	₹98	₹10
B	₹103	₹11
C	₹109	₹11
D	₹112	₹11
E	₹116	₹12
F	₹120	₹12
G	₹124	₹13
H	₹128	₹13

Call Options		
Situation	Exercise Price	Premium
A	₹125	₹9
B	₹122	₹10
C	₹119	₹10
D	₹115	₹11
E	₹112	₹11
F	₹109	₹11
G	₹106	₹12
H	₹103	₹12

Solution:

1. Put Options [Right to Sell]

Situation	Exercise Price (EP)	Current Market Price (CMP)	Premium	Intrinsic Value [Maximum of (EP - CMP), 0]	Time Value [Maximum of (Premium - Intrinsic Value), 0]
(1)	(2)	(3)	(4)	(5) = Max [(2) - (3), 0]	(6) = Max [(4) - (5), 0]
A	₹98	₹112	₹10	0	₹10
B	₹103	₹112	₹11	0	₹11
C	₹109	₹112	₹11	0	₹11
D	₹112	₹112	₹11	0	₹11
E	₹116	₹112	₹12	₹4	₹8
F	₹120	₹112	₹12	₹8	₹4
G	₹124	₹112	₹13	₹12	₹1
H	₹128	₹112	₹13	₹16	0

2. Call Options [Right to Buy]

Situation	Exercise Price (EP)	Current Market Price (CMP)	Premium	Intrinsic Value [Maximum of (CMP-EP), 0]	Time Value [Maximum of (Premium - Intrinsic Value), 0]
(1)	(2)	(3)	(4)	(5) = Max [(3)-(2), 0]	(6) = Max [(4)-(5), 0]
A	₹125	₹112	₹9	0	₹9
B	₹122	₹112	₹10	0	₹10
C	₹119	₹112	₹10	0	₹10
D	₹115	₹112	₹11	0	₹11
E	₹112	₹112	₹11	0	₹11
F	₹109	₹112	₹11	₹3	₹8
G	₹106	₹112	₹12	₹6	₹6
H	₹103	₹112	₹12	₹9	₹3

Illustration 31.

Determine the value of option, both call and put, on expiry for the stock of Nirmal Spice Foods (NSF) Ltd. from the following information-

- Exercise Price - ₹510
- Spot Price on Exercise Date Ranges between ₹495 and ₹525, with interval of ₹5.

Also state what will be the action on the above range of prices for both the options.

Solution:**1. Call Option (Right to Buy)**

Situation	Exercise Price (EP)	Spot Price on Expiry Date (SP_E)	Value of Call [Maximum of ($SP_E - EP$), 0]	Action
(1)	(2)	(3)	(4) = Max [(3) - (2), 0]	(5)
A	₹510	₹495	₹495 - ₹510 = -15 → ₹0	Lapse
B	₹510	₹500	₹500 - ₹510 = -10 → ₹0	Lapse
C	₹510	₹505	₹505 - ₹510 = -5 → ₹0	Lapse
D	₹510	₹510	₹510 - ₹510 = 0 → ₹0	Lapse
E	₹510	₹515	₹515 - ₹510 = 5 → ₹5	Exercise
F	₹510	₹520	₹520 - ₹510 = 10 → ₹10	Exercise
G	₹510	₹525	₹525 - ₹510 = 15 → ₹15	Exercise

2. Put Option (Right to Sell)

Situation	Exercise Price (EP)	Spot Price on Expiry Date (SP_E)	Value of Put [Maximum of ($EP - SP_E$), 0]	Action
(1)	(2)	(3)	(4) = Max [(2) - (3), 0]	(5)
A	₹510	₹495	₹510 - ₹495 = 15 → ₹15	Exercise
B	₹510	₹500	₹510 - ₹500 = 10 → ₹10	Exercise
C	₹510	₹505	₹510 - ₹505 = 5 → ₹5	Exercise
D	₹510	₹510	₹510 - ₹510 = 0 → ₹0	Lapse
E	₹510	₹515	₹510 - ₹515 = -5 → ₹0	Lapse
F	₹510	₹520	₹510 - ₹520 = -10 → ₹0	Lapse
G	₹510	₹525	₹510 - ₹525 = -15 → ₹0	Lapse



Illustration 32 .

Shares of Swastik Industrial Equipments Ltd are quoted at ₹1,200. 30-Days Call option on SPEL is available with an Exercise Price of ₹ 1,250 with a premium of ₹ 30.

Required —

- Time Value and Intrinsic Value of the premium
- Value of the option if the spot price on the expiry date is in the range of ₹ 1,160 — ₹ 1,360, with intervals of ₹ 20.
- Pay graph from Call Buyers perspective.

Solution:

1. Value of Premium

Particulars	Value
Exercise Price (EP)	₹ 1,250
Current Market Price (MP)	₹ 1,200
Premium Paid (P_{PILE})	₹30
MP-EP [₹ 1,200 - ₹ 1,250]	(₹50)
Intrinsic Value Maximum of MP - EP or "0" = Maximum of 0 or (₹50)	₹NIL
Time Value Maximum of (Premium Less Intrinsic Value, 0) = ₹ 30 - 0	₹30

2. Payoff Table [Value of Option and Net Pay Off]

Spot Price on Expiry Date $\leq SP_e$	Exercise Price (EP)	Value of Call [Gross Profit] [Maximum of $(SP_e - EP), 0$]	Action	Premium Paid	Net Pay-Off
(1)	(2)	(3) = $\text{Max}[(1)-(2), 0]$	(4)	(5)	(6) = (3)-(5)
₹1,160	₹1,250	$1,160-1,250 = -90 \rightarrow ₹0$	Lapse	₹30	$0-30 = (\text{₹}30)$
₹1,180	₹1,250	$1,180-1,250 = -70 \rightarrow ₹0$	Lapse	₹30	$0-30 = (\text{₹}30)$
₹1,200	₹1,250	$1,200-1,250 = -50 \rightarrow ₹0$	Lapse	₹30	$0-30 = (\text{₹}30)$
₹ 1,220	₹1,250	$1,220-1,250 = -30 \rightarrow ₹0$	Lapse	₹30	$0-30 = (\text{₹}30)$
₹ 1,240	₹1,250	$1,240-1,250 = -10 \rightarrow ₹0$	Lapse	₹30	$0-30 = (\text{₹}30)$
₹ 1,260	₹ 1,250	$1,260-1,250=10 \rightarrow ₹10$	Exercise	₹30	$10-30 = (\text{₹}20)$
₹ 1,280	₹1,250	$1,280-1,250 = 30 \rightarrow ₹30$	Exercise	₹30	$30-30 = ₹0$
₹ 1,300	₹1,250	$1,300-1,250 = 50 \rightarrow ₹50$	Exercise	₹30	$50-30 = ₹20$
₹1,320	₹1,250	$1,320-1,250 = 70 \rightarrow ₹70$	Exercise	₹30	$70-30 = ₹40$
₹ 1,340	₹1,250	$1,340-1,250 = 90 \rightarrow ₹90$	Exercise	₹30	$90-30 = ₹60$
₹1,360	₹1,250	$1,360-1,250 = 110 \rightarrow ₹110$	Exercise	₹30	$110-30 = ₹80$

3. Pay-Off Graph (Call Buyer's Perspective)

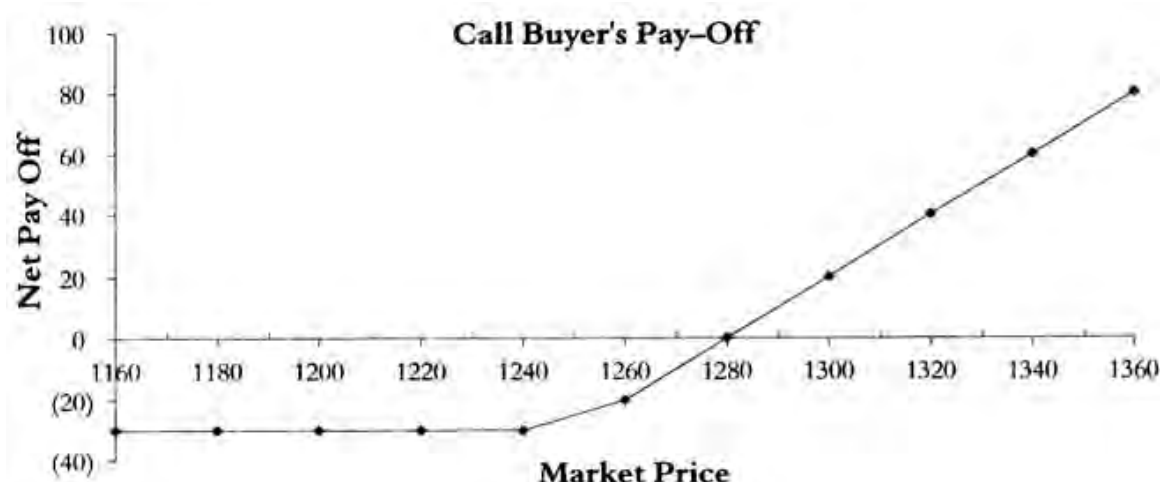


Illustration 33.

CMC Ltd. shares are presently quoted at ₹100.3-Month's call option are carries a premium of ₹15 for a strike price of ₹120, and 3-Month's put option carries a premium of ₹20 for a strike price of ₹120.

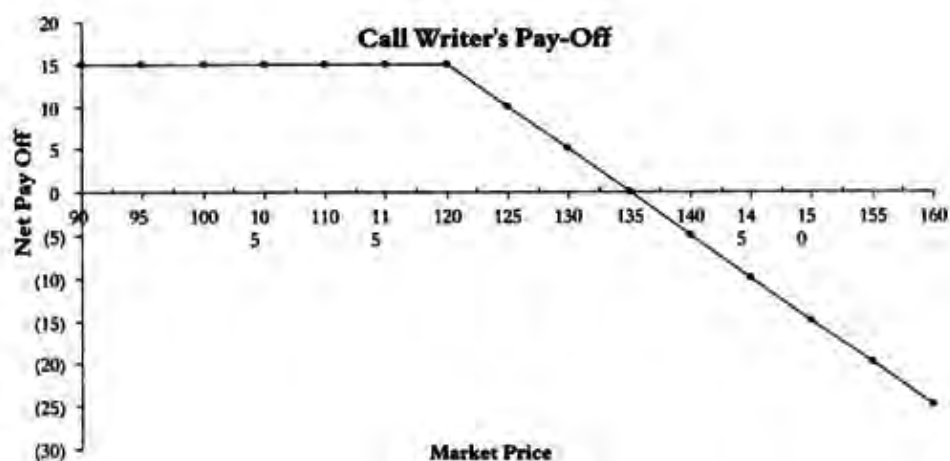
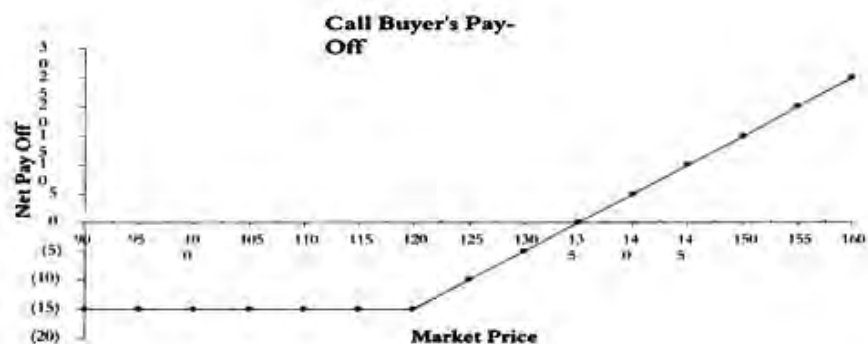
If the spot price on the expiry date is in the range of ₹90 to ₹160, with intervals of ₹5, prepare Net Pay-Off Graph for both Call Option and Put Option, from both the buyer's perspective and the option writer's perspective.

Solution:

1. Net Pay-Off [Call Option] = Buyer and Writer of Call Option

Spot Price on Expiry Date (SP_E)	Exercise Price (EP)	Value of Call [Gross Profit] [Maximum of ($SP_E - EP$), 0]	Action	Option Premium	Net Pay-Off [Call Holder]	Net Pay-Off [Call Writer]
(1)	(2)	(3) = $\text{Max}[(1)-(2), 0]$	(4)	(5)	(6) = (3)-(5)	(7) = (5)-(3)
₹90	₹120	$90 - 120 = -30 \rightarrow ₹0$	Lapse	₹15	$0 - 15 = (\text{₹}15)$	$15 - 0 = ₹15$
₹95	₹120	$95 - 120 = -25 \rightarrow ₹0$	Lapse	₹15	$0 - 15 = (\text{₹}15)$	$15 - 0 = ₹15$
₹100	₹120	$100 - 120 = -20 \rightarrow ₹0$	Lapse	₹15	$0 - 15 = (\text{₹}15)$	$15 - 0 = ₹15$
₹105	₹120	$105 - 120 = -15 \rightarrow ₹0$	Lapse	₹15	$0 - 15 = (\text{₹}15)$	$15 - 0 = ₹15$
₹110	₹120	$110 - 120 = -10 \rightarrow ₹0$	Lapse	₹15	$0 - 15 = (\text{₹}15)$	$15 - 0 = ₹15$
₹115	₹120	$115 - 120 = -5 \rightarrow ₹0$	Lapse	₹15	$0 - 15 = (\text{₹}15)$	$15 - 0 = ₹15$
₹120	₹120	$120 - 120 = 0 \rightarrow ₹0$	Lapse	₹15	$0 - 15 = (\text{₹}15)$	$15 - 0 = ₹15$
₹125	₹120	$125 - 120 = 5 \rightarrow ₹5$	Exercise	₹15	$5 - 15 = (\text{₹}10)$	$15 - 5 = ₹10$
₹130	₹120	$130 - 120 = 10 \rightarrow ₹10$	Exercise	₹15	$10 - 15 = (\text{₹}5)$	$15 - 10 = ₹5$
₹135	₹120	$135 - 120 = 15 \rightarrow ₹15$	Exercise	₹15	$15 - 15 = ₹0$	$15 - 15 = ₹0$
₹140	₹120	$140 - 120 = 20 \rightarrow ₹20$	Exercise	₹15	$20 - 15 = ₹5$	$15 - 20 = (\text{₹}5)$
₹145	₹120	$145 - 120 = 25 \rightarrow ₹25$	Exercise	₹15	$25 - 15 = ₹10$	$15 - 25 = (\text{₹}10)$
₹150	₹120	$150 - 120 = 30 \rightarrow ₹30$	Exercise	₹15	$30 - 15 = ₹15$	$15 - 30 = (\text{₹}15)$
₹155	₹120	$155 - 120 = 35 \rightarrow ₹35$	Exercise	₹15	$35 - 15 = ₹20$	$15 - 35 = (\text{₹}20)$
₹160	₹120	$160 - 120 = 40 \rightarrow ₹40$	Exercise	₹15	$40 - 15 = ₹25$	$15 - 40 = (\text{₹}25)$

2. Pay-Off Graph [Call Option]



3. Net Pay-Off [Put Option] = Buyer and Writer of Put Option

Spot Price on Expiry Date (SP_E)	Exercise Price (EP)	Value of Call [Gross Profit] [Maximum of $(EP - SP_E), 0$]		Action	Option Premium	Net Pay-Off [Call Holder]	Net Pay-Off [Call Writer]
(1)	(2)	(3) = Max [(2)	- (1), 0]	(4)	(5)	(6) = (3) - (5)	(7) = (5) - (3)
₹90	₹120	120 - 90 = 30	→ ₹30	Exercise	₹20	30 - 20 = ₹10	20 - 30 = (₹10)
₹95	₹120	120 - 95 = 25	→ ₹25	Exercise	₹20	25 - 20 = ₹5	20 - 25 = (₹5)
₹100	₹120	120 - 100 = 20	→ ₹20	Exercise	₹20	20 - 20 = ₹0	20 - 20 = ₹0
₹105	₹120	120 - 105 = 15	→ ₹15	Exercise	₹20	15 - 20 = (₹5)	20 - 15 = ₹5
₹110	₹120	120 - 110 = 10	→ ₹10	Exercise	₹20	10 - 20 = (₹10)	20 - 10 = ₹10

₹115	₹120	$120 - 115 = 5 \rightarrow ₹5$	Exercise	₹20	$5 - 20 = (₹15)$	$20 - 5 = ₹15$
₹120	₹120	$120 - 120 = 0 \rightarrow ₹0$	Lapse	₹20	$0 - 20 = (₹20)$	$20 - 0 = ₹20$
₹125	₹120	$120 - 125 = -5 \rightarrow ₹0$	Lapse	₹20	$0 - 20 = (₹20)$	$20 - 0 = ₹20$
₹130	₹120	$120 - 130 = -10 \rightarrow ₹0$	Lapse	₹20	$0 - 20 = (₹20)$	$20 - 0 = ₹20$
₹135	₹120	$120 - 135 = -15 \rightarrow ₹0$	Lapse	₹20	$0 - 20 = (₹20)$	$20 - 0 = ₹20$
₹140	₹120	$120 - 140 = -20 \rightarrow ₹0$	Lapse	₹20	$0 - 20 = (₹20)$	$20 - 0 = ₹20$
₹145	₹120	$120 - 145 = -25 \rightarrow ₹0$	Lapse	₹20	$0 - 20 = (₹20)$	$20 - 0 = ₹20$
₹150	₹120	$120 - 150 = -30 \rightarrow ₹0$	Lapse	₹20	$0 - 20 = (₹20)$	$20 - 0 = ₹20$
₹155	₹120	$120 - 155 = -35 \rightarrow ₹0$	Lapse	₹20	$0 - 20 = (₹20)$	$20 - 0 = ₹20$
₹160	₹120	$120 - 160 = -40 \rightarrow ₹0$	Lapse	₹20	$0 - 20 = (₹20)$	$20 - 0 = ₹20$

4. Pay-off Graph [Put Option]

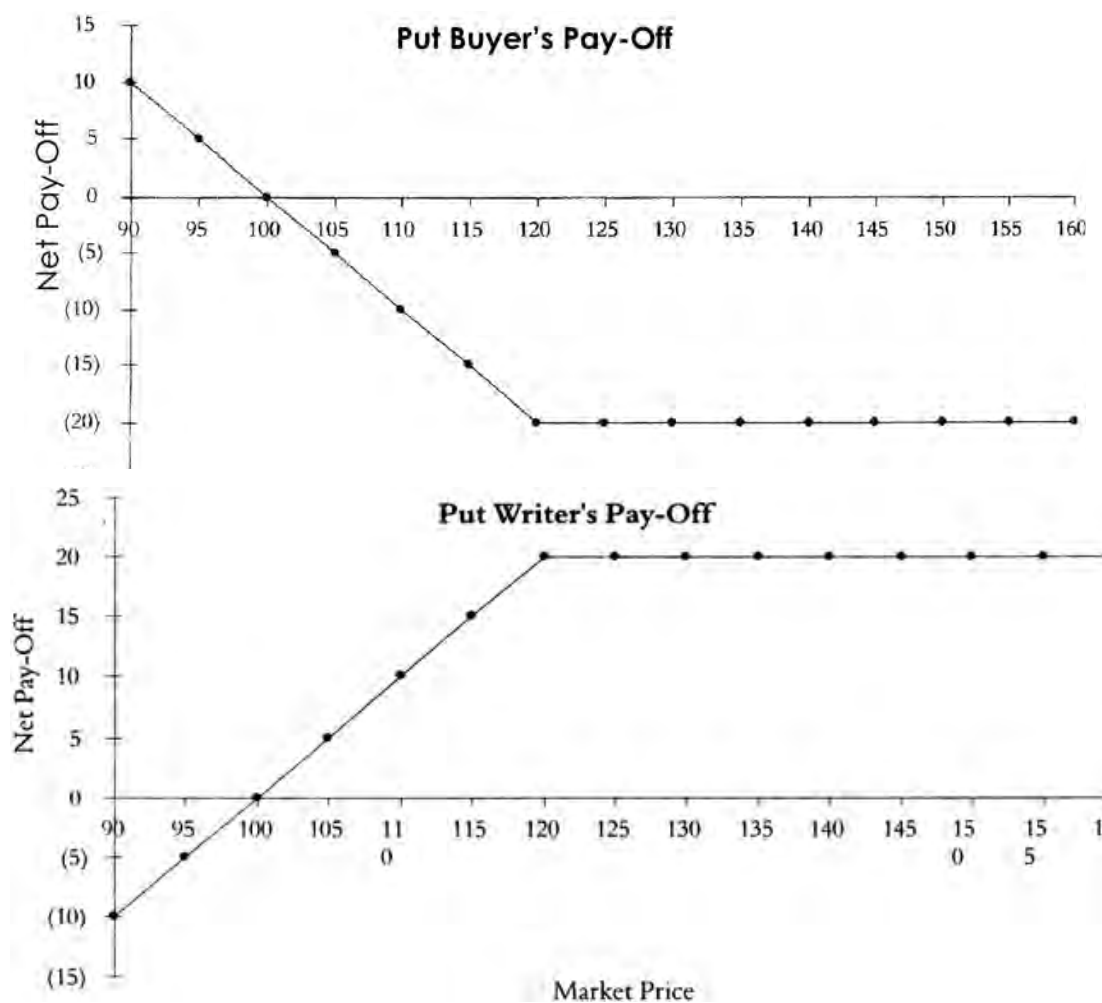




Illustration 34.

Fill up the blanks in the following “Break Even Price” table —

Case	Option	Party	Exercise Price	Premium	Market Price
1	Call	Buyer	?	20	160
2	?	Seller	2000	300	1700
3	?	Buyer	50	10	40
4	?	Seller	80	10	90
5	Put	Buyer	?	50	250
6	?	Seller	320	50	370
7	Call	Buyer	680	100	?
8	Call	Seller	?	80	580
9	Put	Buyer	1200	?	1020
10	Put	Seller	?	330	1870

Solution:

Case	Option	Party	Exercise Price	Premium	Market Price	Reason / Computation
1	Call	Buyer	140	20	160	Call $\rightarrow$ MP = EP + Premium, for Pay Off to be “0”. $\rightarrow 160 - 20 = ₹140$
2	Put	Seller	2000	300	1700	$2000 - 300 = ₹1700 \rightarrow$ MP = EP - Premium. Therefore, it is a Put Option
3	Put	Buyer	50	10	40	$50 - 10 = ₹40 \rightarrow$ MP = EP - Premium. Therefore, it is a Put Option.
4	Call	Seller	80	10	90	$80 + 10 = ₹90 \rightarrow$ MP = EP + Premium. Therefore, it is a Call Option.
5	Put	Buyer	300	50	250	Put Option $\rightarrow$ MP = EP - Premium. $\rightarrow$ EP = MP + Premium = $250 - 50 = ₹300$
6	Call	Seller	320	50	370	$320 + 50 = ₹370 \rightarrow$ MP = EP + Premium. Therefore, it is a Call Option.
7	Call	Buyer	680	100	780	Call $\rightarrow$ MP = EP + Premium, for Pay Off to be “0”. $680 + 100 = ₹780$
8	Call	Seller	500	80	580	Call $\rightarrow$ MP = EP + Premium, for Pay Off to be “0”. $\rightarrow$ EP = MP - Premium $\rightarrow 580 - 80 = ₹500$.
9	Put	Buyer	1200	180	1020	Put $\rightarrow$ MP = EP - Premium, for Pay Off to be “0”. $\rightarrow$ Premium = EP - MP $\rightarrow 1200 - 1020 = ₹180$.
10	Put	Seller	2200	330	1870	Put $\rightarrow$ MP = EP - Premium, for Pay Off to be “0”. $\rightarrow$ EP = MP + Premium $\rightarrow 1870 - 330 = ₹2,200$.

Illustration 35.

Fill up the blanks in the following table —

Case	Op- tion	Exercise Price (EP)	Pre- mium	Holder's Max- imum Loss	Holder's Maximum Gain	Writer's Maxi- mum Loss	Writer's Maximum Gain	Break Even Price
1	Call	520	75	?	?	?	?	?
2	Put	700	140	?	?	?	?	?
3	Put	?	?	4	16	16	4	?
4	Call	?	?	200	?	Unlimited	?	1725
5	?	350	70	70	280	280	70	280
6	?	80	?	12	Unlimited	?	12	?
7	?	?	?	?	?	Unlimited	18	138
8	?	?	?	?	?	592	148	592
9	Call	240	40	40	Unlimited	Unlimited	40	280
10	Put	900	?	180	?	?	?	?

Solution:

Case	Option	Exercise Price (EP)	Premium	Holder's Maximum Loss	Holder's Maximum Gain	Writer's Maximum Loss	Writer's Maximum Gain	Break Even Price
1	Call	520	75	75	Unlimited	Unlimited	75	595
2	Put	700	140	140	560	560	140	560
3	Put	20	4	4	16	16	4	16
4	Call	1500	200	200	Unlimited	Unlimited	200	1700
5	Put	350	70	70	280	280	70	280
6	Call	80	12	12	Unlimited	Unlimited	12	92
7	Call	120	18	18	Unlimited	Unlimited	18	138
8	Put	740	148	148	592	592	148	592
9	Call	240	40	40	Unlimited	Unlimited	40	280
10	Put	900	180	180	720	720	180	720

General Rules:

1. All Cases, Option Holder's Maximum Loss = Option Writer's Maximum Gain = Amount of Premium
2. If Option Type = Call, then—
 - Holder's Maximum Gain = Writer's Maximum Loss = Unlimited [Conversely, if Holder's Maximum Gain = Writer's Maximum Loss = Unlimited, then the nature of the option is Call]
 - Break Even Price (No Profit No Loss Situation) = Exercise Price Plus Premium
3. If Option Type = Put, then —



- Holder's Maximum Gain = Writer's Maximum Loss = Exercise Price Less Premium = Break Even Price [Conversely, if Holder's Maximum Gain = Writer's Maximum Loss = Break Even Price, then nature of the option is Put]
- Break Even Price (No Profit No Loss Situation) = Exercise Price Less Premium

Illustration 36.

From the following information available regarding 8 options, advice on the course of action to be followed by Sandip (who can either hold or write an option) —

Security	Nature of Option	Exercise Price	Premium Payable [Value of Option]	Spot Price on Expiry Date
A	Put	₹240	₹25	₹210
B	Call	₹1000	₹120	₹1150
C	Call	₹600	₹50	₹640
D	Put	₹210	₹20	₹200
E	Put	₹700	₹80	₹640
F	Call	₹100	₹12	₹110
G	Put	₹2200	₹180	₹2000
H	Call	₹1400	₹150	₹1580

Solution:

Security	Nature of Option	Exercise Price	Premium [Actual Value] of Option]	Spot Price on Expiry Date	Theoretical Value	Position	Course of Action	Gain on Action
A	Put	₹240	₹25	₹210	₹30	Undervalued	Buy Put Option, Buy Stock in Spot Market	₹5
B	Call	₹1,000	₹120	₹1,150	₹150	Undervalued	Buy Call Option, Sell Stock in Spot Market	₹30
C	Call	₹600	₹50	₹640	₹40	Overvalued	Sell Call Option, Buy Stock in Spot Market	₹10
D	Put	₹210	₹20	₹200	₹10	Overvalued	Sell Put Option, Sell Stock in Spot Market	₹10
E	Put	₹700	₹80	₹640	₹60	Overvalued	Sell Put Option, Sell Stock in Spot Market	₹20
F	Call	₹100	₹12	₹110	₹10	Overvalued	Sell Call Option, Buy Stock in Spot Market	₹2
G	Put	₹2,200	₹180	₹2,000	₹200	Undervalued	Buy Put Option, Buy Stock in Spot Market	₹20
H	Call	₹1,400	₹150	₹1,580	₹180	Undervalued	Buy Call Option, Sell Stock in Spot Market	₹30

Rules Applied:**1. Overvalued vs. Undervalued:**

- Actual Value > Theoretical Value of Option, Option is Overvalued.
- Actual Value < Theoretical Value of Option, Option is Undervalued.

2. Action on Option: If option is —

Option	Undervalued [Option Holder]	Overvalued [Option Writer]
Call	Buy Call Option, Sell Stock in Spot Market	Sell Call Option, Buy Stock in Spot Market
Put	Buy Put Option, Buy Stock in Spot Market	Sell Put Option, Sell Stock in Spot Market

- Undervalued, Buy Option, Sell Stock; (Sandips position is that of Options Holder)
- Overvalued, Sell Option, Buy Stock. (Sandips position is that of Options Writer)

3. Gain / Loss on Action: Inflow **Less** Outflow, determined as under —

Option	Undervalued [Option Holder]	Overvalued [Option Writer]
Call	• Inflow: Sale Value of Stock in Spot Market • Outflow: Premium Payment + Exercise Price of Call Option	• Inflow: Premium Receipt + Exercise Price of Call Option • Outflow: Purchase Price of Stock in Spot Market
Put	• Inflow: Sale Value of Stock in Exercise Price in Options Market • Outflow: Premium Payment + Purchase Price of Stock in Spot Market	• Inflow: Premium Receipt + Sale Price of Stock in Spot Market • Outflow: Purchase Price of Stock at Exercise Price in Options Market

Illustration 37.

A put and a call option each have an expiration date 6 months hence and an exercise price of ₹9. The interest rate for the 6 month period is 3 per cent.

- (a) If the put has a market price of ₹2 and share is worth ₹10 per share, what is the value of the call?
- (b) If the put has a market price of ₹1 and the call ₹4, what is the value of the share per share?
- (c) If the call has a market value of ₹5 and market price of the share is ₹12 per share, what is the value of the put?

Solution:**Under Put Call Parity -**

→ Value of Call + Present Value of Exercise Price = Current Spot Price + Value of Put

$$\rightarrow C + EP \times e^{-rt} = SP_0 + P$$

Case (a)	Case(b)	Case (c)
$\rightarrow C + EP \times e^{-rt} = SP_0 + P$	$\rightarrow C + EP \times e^{-rt} = SP_0 + P$	$\rightarrow C + EP \times e^{-rt} = SP_0 + P$
$\rightarrow C = SP_0 + P - EP \times e^{-rt}$	$\rightarrow SP_0 = C + EP \times e^{-rt} - P$	$\rightarrow P = C + EP \times e^{-rt} - SP_0$
$\rightarrow C = 10 + 2 - (10 \times e^{-0.03 \times (6/12)})$	$\rightarrow SP_0 = 4 + (9 \times e^{-0.03 \times (6/12)}) - 1$	$\rightarrow P = 5 + 9 \times e^{-0.03 \times (6/12)} - 12$



$\rightarrow C = 12 - (9 \div 1.01511)$	$\rightarrow SP_0 = 4 + (9 \div 1.01511) - 1$	$\rightarrow P = 5 + 8.86 - 12$
$\rightarrow C = 12 - 8.86 = 3.14$	$\rightarrow SP_0 = 11.86$	$\rightarrow P = 1.86$
Value of Call = ₹ 3.14	Value of Share = ₹11.86	Value of Put = ₹ 1.86

Illustration 38.

Shoaib is furnished with the following information about securities of two Companies — Manju Ltd and Sanju Ltd.

1. Manju Ltd: Call option is traded is at ₹85 for an exercise price of ₹700. Presently stock of Manju Ltd is traded for ₹650. Put options is available for ₹110.
2. Sanju Ltd: Put option is traded at ₹40 at an exercise price of ₹200. Presently stock of Sanju are traded at ₹180. Call options are available for ₹20.

If Shoaib has sufficient money and also holds stock in both these companies, wants to make only ascertained profit and no loss, advice him on the course of action and the resultant gain / loss.

Risk Free Interest rate may be assumed at 10% and expiry date for option is 3 Months away.

Solution:

1. Manju Ltd

(a) Computation of Theoretical Value of Put Option:

$$C + PV \text{ of EP of Call} = CMP + P$$

$$\rightarrow ₹85 + ₹700 \times e^{-0.10 \times 0.25} = ₹650 + P$$

$$\rightarrow P = ₹85 + ₹700 \times 0.975 - ₹650$$

$$\rightarrow P = ₹85 + ₹682.50 - ₹650$$

$$= ₹117.50$$

(b) **Evaluation:** Theoretical Price of ₹117.50 > Actual Price of ₹110. Therefore, Put Option is undervalued.

(c) Action:

Now	3-Months Later
• Sell Call Option (Write Call) at ₹85. • Borrow ₹675 at 10% p.a. for 3 months (Cost of Buying Put at ₹110 + Cost of Stock in Spot Market ₹650 - Inflow for writing Call ₹85) • Buy Put Option at ₹110 • Buy Stock at ₹650.	Spot Price on Expiry is more than ₹700 • Inflow: Call Option will be exercised by the Option Holder. Therefore, sell stock and receive for ₹700. • Outflow: Repay borrowal of ₹692 including interest i.e. $₹675 \times e^{0.10 \times 0.25} = ₹675 \times 1.0253$ • Net Gain 3-Months Later: ₹700 - ₹692 = ₹8 Spot Price on Expiry is less than ₹700 • Inflow: Exercise Put Option. Sell Stock and receive ₹700. • Outflow: Repay borrowal of ₹692 including interest i.e. $₹675 \times e^{0.10 \times 0.25} = ₹675 \times 1.0253$ • Net Gain 3-Months Later: ₹700 - ₹692 = ₹8

2. Sanju Ltd

(a) Computation of Theoretical Value of Call Option:

$$C + \text{PV of EP of Call} = \text{CMP} + P$$

$$\rightarrow C + ₹200 \times e^{-0.10 \times 0.25} = ₹180 + 40$$

$$\rightarrow C = ₹220 - ₹200 \times 0.975$$

$$\rightarrow C = ₹220 - ₹195 = ₹25$$

(b) Evaluation: Theoretical Price of ₹25 > Actual Price of ₹20. Therefore, Call Option is undervalued.

(c) Action:

Now	3-Months Later
- Sell Put Option (Write Put) at ₹40. (Inflow) - Sell Stock at ₹180 - Buy Call Option at ₹20 - Invest ₹200 in Risk Free Investments at 10% p.a. for 3 Months (Receipt on Sale of Stock ₹180 + Receipt on Sale of Put Option ₹40 - Cost of Call Option ₹20)	Spot Price on Expiry is more than ₹200 Inflow: Realize ₹205 from Investment including interest ($₹200 \times e^{0.10 \times 0.25} = ₹200 \times 1.0253$). Outflow: Call Option will be exercised. Pay ₹200 and buy stock. Net Gain 3-Months Later: ₹205 - ₹200 = ₹5 Spot Price on Expiry is less than ₹200 Inflow: Realize ₹205 from Investment including interest ($₹200 \times e^{0.10 \times 0.25} = ₹200 \times 1.0253$). Outflow: Put Option holder will exercise option. Pay ₹200 and buy stock. Net Gain 3-Months Later: ₹205 - ₹200 = ₹5

Illustration 39.

Sagar is contemplating trading in options of stock of Kiran Industry. The market looks bullish and Sagar wants to make quick bucks. However, he is also apprehensive of unexpected fall as well, since in the past, markets have been very volatile. He wants to restrict his loss and also fix up his maximum gain.

Advise him on the course of action, and compute his maximum gain / loss from the following information:

Exercise Price	Premium for Call Option	Premium for Put Option
₹400	₹80	₹100
₹450	₹50	₹130

Also prepare the pay-off graph for all the suggested courses of action.

Solution:

A. BULL SPREAD USING CALL OPTIONS

1. Activity:

Outlook	Bullish
Option	Call
Activity	Buy Call Option with Lower Exercise Price (EP_1), Write Call Option with Higher Exercise Price (EP_2)



Maximum Loss	Net Cash Outgo on account of difference in premium on options with Higher Exercise Price and Lower Exercise Price → Premium Paid on Buying Call Option (P_1) Less Premium Collected on Writing Call Option (P_2) = ₹80 - ₹50 = ₹30
Maximum Gain	→ Net Cash Inflow upon exercise of both options reduced by Net Cash Outgo towards Premium Higher Exercise Price (EP_2) Less Lower Exercise Price (EP_1) Less Maximum Loss = ₹450 - ₹400 - ₹30 = ₹20

2. Pay Off Table:

[Figures in ₹]

Price on Expiry-Date	As Holder of Option [call1]				As Writer of Option [Call 2]				Net Pay Off
	Exercise Price [EP_1]	Premium [P_1]	Action	Pay Off [Note 1]	Exercise Price [EP_2]	Premium [P_2]	Action	Pay Off [Note 2]	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10) = (5) + (9)
340	400	80	Lapse	(80)	450	50	Lapse	50	(30)
350	400	80	Lapse	(80)	450	50	Lapse	50	(30)
360	400	80	Lapse	(80)	450	50	Lapse	50	(30)
370	400	80	Lapse	(80)	450	50	Lapse	50	(30)
380	400	80	Lapse	(80)	450	50	Lapse	50	(30)
390	400	80	Lapse	(80)	450	50	Lapse	50	(30)
400	400	80	Lapse	(80)	450	50	Lapse	50	(30)
410	400	80	Exercise	(70)	450	50	Lapse	50	(20)
420	400	80	Exercise	(60)	450	50	Lapse	50	(10)
430	400	80	Exercise	(50)	450	50	Lapse	50	0
440	400	80	Exercise	(40)	450	50	Lapse	50	10
450	400	80	Exercise	(30)	450	50	Lapse	50	20
460	400	80	Exercise	(20)	450	50	Exercise	40	20
470	400	80	Exercise	(10)	450	50	Exercise	30	20
480	400	80	Exercise	0	450	50	Exercise	20	20
490	400	80	Exercise	10	450	50	Exercise	10	20
500	400	80	Exercise	20	450	50	Exercise	0	20
510	400	80	Exercise	30	450	50	Exercise	(10)	20
520	400	80	Exercise	40	450	50	Exercise	(20)	20
530	400	80	Exercise	50	450	50	Exercise	(30)	20

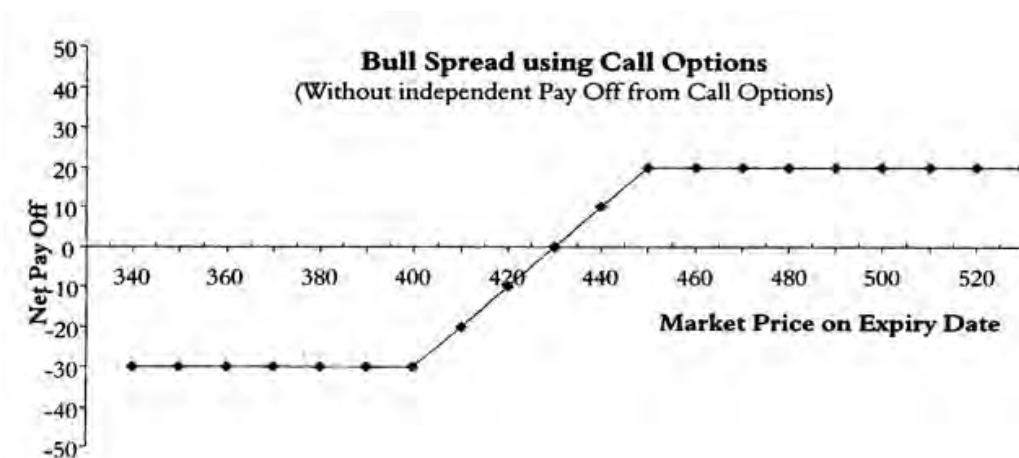
Note: Pay off: Based on action on the date of expiry —

Action	Call Option 1 (Call Holder)	Call Option 2 (Call Writer)
Lapse	Inflow: None Less Outflow: Premium (Col.3)	Inflow: Premium (Col.7) Less Outflow: None
Exercise	Inflow: Price on Expiry Date (Col.1) Less Outflow: Exercise Price (Col.2) Premium (Col.3)	Inflow: Premium (Col.7) Exercise Price (Col.6) Less Outflow: Price on Expiry Date (Col.1)

3. Pay Off Graph (Including Pay Off from Buying Call and Writing Call):



4. Pay Off Graph (Bull Spread Only):



B. BEARISH SPREAD USING CALL OPTIONS

1. Activity:

Outlook	Bearish
Option	Call
Activity	Buy Call Option with Higher Exercise Price (EP_2), Write Call Option with Lower Exercise Price (EP_1)
Maximum Loss	→ Net Cash outflow upon exercise of both options reduced by Net Cash Inflow towards Premium Higher Exercise Price (EP_2) Less Lower Exercise Price (EP_1) Less Maximum Gain = ($₹450 - ₹400 - ₹30$) = ₹20



Maximum Gain	Net Cash Outgo on account of difference in premium on options with Higher Exercise Price and Lower Exercise Price → Premium Collected on Writing Call Option (P_1) Less Premium Paid on Buying Call Option (P_2) = ₹80 - ₹50 = ₹30

2. Pay Off Table:

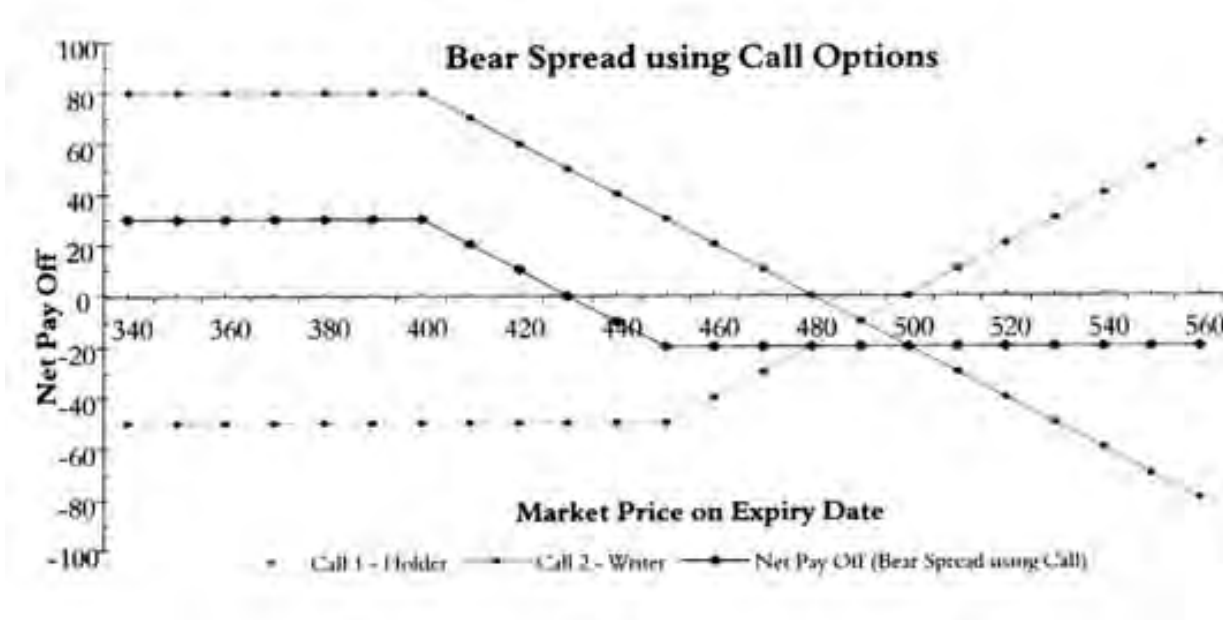
[Figures in ₹]

Price on Expiry Date	As Holder of Option [Call 1]				As Writer of Option [Call 2]				Net Pay Off
	Exercise Price [EP_1]	Premium [P_1]	Action	Pay Off [Note]	Exercise Price [EP_2]	Premium [P_2]	Action	Pay Off [Note]	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10) = (5) + (9)
340	450	50	Lapse	(50)	400	80	Lapse	80	30
350	450	50	Lapse	(50)	400	80	Lapse	80	30
360	450	50	Lapse	(50)	400	80	Lapse	80	30
370	450	50	Lapse	(50)	400	80	Lapse	80	30
380	450	50	Lapse	(50)	400	80	Lapse	80	30
390	450	50	Lapse	(50)	400	80	Lapse	80	30
400	450	50	Lapse	(50)	400	80	Lapse	80	30
410	450	50	Lapse	(50)	400	80	Exercise	70	20
420	450	50	Lapse	(50)	400	80	Exercise	60	10
430	450	50	Lapse	(50)	400	80	Exercise	50	0
440	450	50	Lapse	(50)	400	80	Exercise	40	(10)
450	450	50	Lapse	(50)	400	80	Exercise	30	(20)
460	450	50	Exercise	(40)	400	80	Exercise	20	(20)
470	450	50	Exercise	(30)	400	80	Exercise	10	(20)
480	450	50	Exercise	(20)	400	80	Exercise	0	(20)
490	450	50	Exercise	(10)	400	80	Exercise	(10)	(20)
500	450	50	Exercise	0	400	80	Exercise	(20)	(20)
510	450	50	Exercise	10	400	80	Exercise	(30)	(20)
520	450	50	Exercise	20	400	80	Exercise	(40)	(20)
530	450	50	Exercise	30	400	80	Exercise	(50)	(20)
540	450	50	Exercise	40	400	80	Exercise	(60)	(20)
550	450	50	Exercise	50	400	80	Exercise	(70)	(20)
560	450	50	Exercise	60	400	80	Exercise	(80)	(20)

Note: Pay off: Based on action on the date of expiry —

Action	Call Option 1 (Call Holder)	Call Option 2 (Call Writer)
Lapse	Inflow: None Less Outflow: Premium (Col.3)	Inflow: Premium (Col.7) Less Outflow: None
Exercise	Inflow: Price on Expiry Date (Col.1) Less Outflow: Exercise Price (Col.2) Premium (Col.3)	Inflow: Premium (Col.7) Exercise Price (Col.6) Less Outflow: Price on Expiry Date (Col.1)

3. Pay Off Graph (Including Pay Off from Buying Call and Writing Call):



4. Pay Off Graph (Bear Spread Only):





1. Activity:

Outlook	Bullish
Option	Put
Activity	Buy Put Option with Lower Exercise Price (EP_1), Write Put Option with Higher Exercise Price (EP_2)
Maximum Loss	→ Net Cash outflow on exercise of both options reduced by Net Cash Inflow towards Premium Higher Exercise Price (EP_2) Less Lower Exercise Price (EP_1) Less Maximum Gain = ₹450 - ₹400 - ₹30 = ₹20
Maximum Gain	Net Cash Inflow on account of difference in premium on options with Higher Exercise Price and Lower Exercise Price → Premium Collected on Writing Put Option (P_2) Less Premium Paid on Buying Put Option (P_1) = ₹130 - ₹100 = ₹30

C. BULL SPREAD USING PUT OPTIONS

2. Pay of Table :

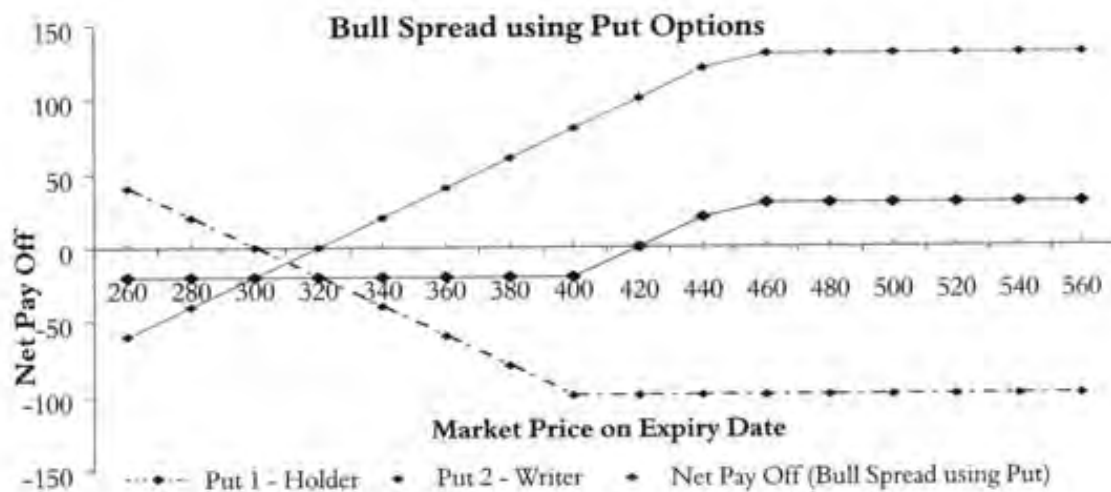
[Figure in ₹]

Price on Expiry Date	As Holder of Option [Put 1]				As Writer of Option [Put 2]				Net Pay Off
	Exercise Price [EP_1]	Premium [P_1]	Action	Pay Off [Note]	Exercise Price [EP_2]	Premium [P_2]	Action	Pay Off [Note]	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10) = (5) + (9)
260	400	100	Exercise	40	450	130	Exercise	(60)	(20)
280	400	100	Exercise	20	450	130	Exercise	(40)	(20)
300	400	100	Exercise	0	450	130	Exercise	(20)	(20)
320	400	100	Exercise	(20)	450	130	Exercise	0	(20)
340	400	100	Exercise	(40)	450	130	Exercise	20	(20)
360	400	100	Exercise	(60)	450	130	Exercise	40	(20)
380	400	100	Exercise	(80)	450	130	Exercise	60	(20)
400	400	100	Lapse	(100)	450	130	Exercise	80	(20)
420	400	100	Lapse	(100)	450	130	Exercise	100	0
440	400	100	Lapse	(100)	450	130	Exercise	120	20
460	400	100	Lapse	(100)	450	130	Lapse	130	30
480	400	100	Lapse	(100)	450	130	Lapse	130	30
500	400	100	Lapse	(100)	450	130	Lapse	130	30
520	400	100	Lapse	(100)	450	130	Lapse	130	30
540	400	100	Lapse	(100)	450	130	Lapse	130	30
560	400	100	Lapse	(100)	450	130	Lapse	130	30

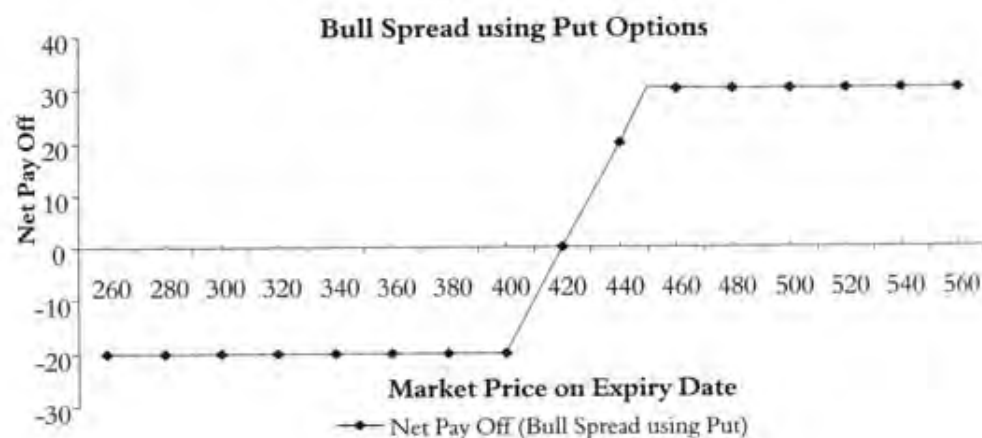
Note: Pay off: Based on action on the date of expiry —

Action	Put Option 1 (Put Holder)	Put Option 2 (Put Writer)
Lapse	Inflow: None Less Outflow: Premium (Col.3)	Inflow: Premium (Col.7) Less Outflow: None
Exercise	Inflow: Exercise Price (Col.2) Less Outflow: Price on Expiry Date (Col.1) Premium (Col.3)	Inflow: Premium (Col.7) Price on Expiry Date (Col.1) Less Outflow: Exercise Price (Col.6)

3. Pay Off Graph (Including Pay Off from Buying Put and Writing Put):



4. Pay Off Graph (Bull Spread Only):





D. BULL SPREAD USING PUT OPTIONS

1. Activity:

Outlook	Bearish
Option	Put
Activity	Buy Put Option with Higher Exercise Price (EP_2), Write Put Option with Lower Exercise Price (EP_1)
Maximum Loss	Net Cash Outgo on account of difference in premium on options with Higher Exercise Price and Lower Exercise Price → Premium paid on Buying Put Option (P_2) Less Premium Received on Writing Put Option (P_1) = ₹130 - ₹100 = ₹30
Maximum Gain	→ Net Cash Inflow upon exercise of both options reduced by Net Cash Outgo towards Premium Higher Exercise Price (EP_2) Less Lower Exercise Price (EP_1) Less Maximum Loss = ₹450 - ₹400 - ₹30 = ₹20

2. PayOff Table:

[Figures in ₹]

Price on Expiry Date	As Holder of Option [Put 1]				As Writer of Option [Put 2]				Net Pay Off
	Exercise Price [EP_1]	Premium [P_1]	Action	Pay Off [Note]	Exercise Price [EP_2]	Premium [P_2]	Action	Pay Off [Note]	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10) = (5) + (9)
260	450	130	Exercise	60	400	100	Exercise	(40)	20
280	450	130	Exercise	40	400	100	Exercise	(20)	20
300	450	130	Exercise	20	400	100	Exercise	0	20
320	450	130	Exercise	0	400	100	Exercise	20	20
340	450	130	Exercise	(20)	400	100	Exercise	40	20
360	450	130	Exercise	(40)	400	100	Exercise	60	20
380	450	130	Exercise	(60)	400	100	Exercise	80	20
400	450	130	Exercise	(80)	400	100	Lapse	100	20
420	450	130	Exercise	(100)	400	100	Lapse	100	0
440	450	130	Exercise	(120)	400	100	Lapse	100	(20)
460	450	130	Lapse	(130)	400	100	Lapse	100	(30)
480	450	130	Lapse	(130)	400	100	Lapse	100	(30)
500	450	130	Lapse	(130)	400	100	Lapse	100	(30)
520	450	130	Lapse	(130)	400	100	Lapse	100	(30)
540	450	130	Lapse	(130)	400	100	Lapse	100	(30)
560	450	130	Lapse	(130)	400	100	Lapse	100	(30)

Note: Pay off: Based on action on the date of expiry —

Action	Put Option 1 (Put Holder)	Put Option 2 (Put Writer)
Lapse	Inflow: None Less Outflow: Premium (Col.3)	Inflow: Premium (Col.7) Less Outflow: None
Exercise	Inflow: Exercise Price (Col.2) Less Outflow: Price on Expiry Date (Col.1) Premium (Col.3)	Inflow: Premium (Col.7) Price on Expiry Date (Col.1) Less Outflow: Exercise Price (Col.6)

3. Pay Off Graph (Including Pay Off from Buying Put and Writing Put):



4. Pay Off Bear Spread using put Option

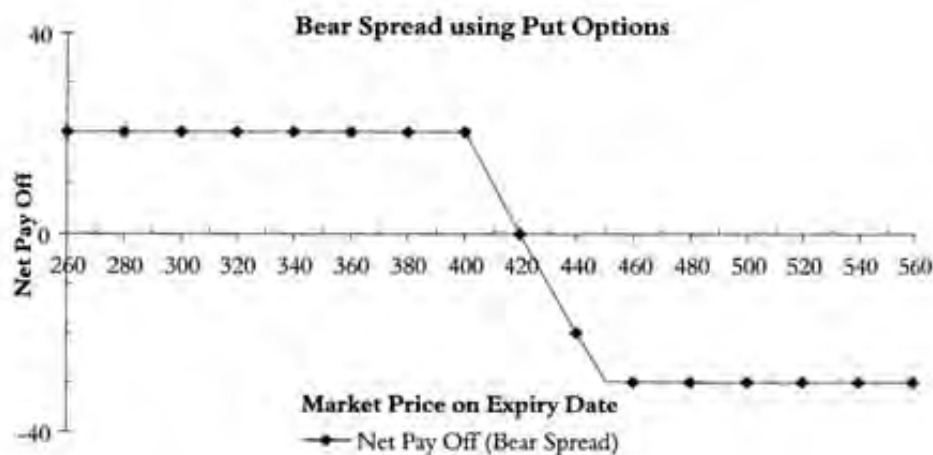


**Illustration 40.**

Following information relates to Options on stock of Gupta Aluminum Limited (GAL)—

Exercise Price	Premium for Call Option	Premium for Put Option
₹100	₹20	₹16
₹110	₹15	₹19
₹120	₹12	₹25

Abhilasha expects prices of GAL to change, but not significantly in either direction. She wants to cash in on the opportunity and make some profit. She is willing to go for it, if she can freeze her maximum loss.

Advice.

Solution:

A. BASIC VALUES AND THEIR NOTATION

Exercise Price	Premium for Call Option	Premium for Put Option
$EP_1 \rightarrow ₹100$	$P_{C1} \rightarrow ₹20$	$P_{P1} \rightarrow ₹16$
$EP_2 \rightarrow ₹110$	$P_{C2} \rightarrow ₹15$	$P_{P1} \rightarrow ₹19$
$EP_3 \rightarrow ₹120$	$P_{C3} \rightarrow ₹12$	$P_{P1} \rightarrow ₹25$

B. STRATEGY

Abhilasha should opt for Butterfly Strategy, under either of the following approaches -

- Butterfly Spread using Call Options:
 - Writing two calls at EP_2 , Buying one call each at EP_1 and EP_3 .
 - Buying two calls at EP_2 , Writing one call each at EP_1 and EP_3 .
- Butterfly Spread using Put Options:
 - Writing two puts at EP_2 , Buying one put each at EP_1 and EP_3 .
 - Buying two puts at EP_2 , Writing one put each at EP_1 and EP_3 .

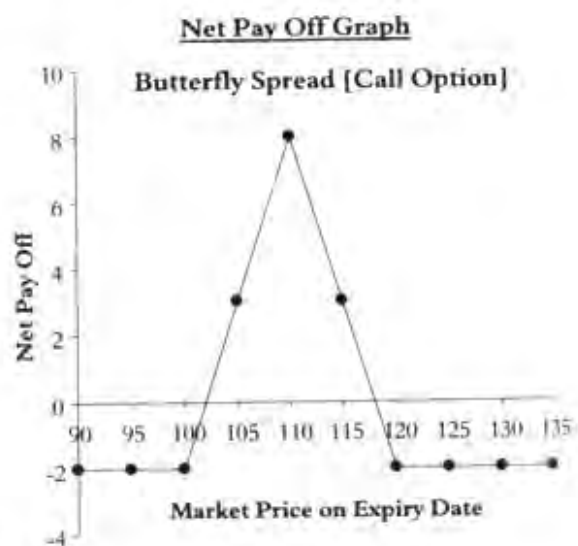
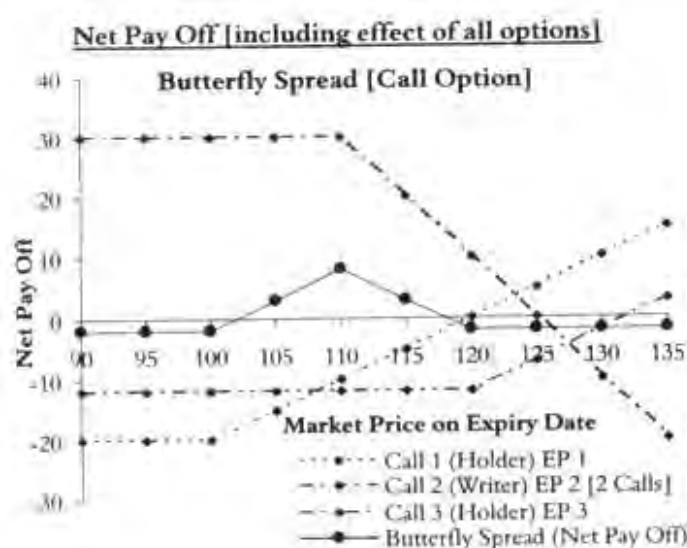
C. BUTTERFLY SPREAD USING CALL OPTIONS**1. Writing Two Calls at EP_2 , Buying One Call each at EP_1 and EP_3** **(a) Computation of Net Pay Off [Figures in ₹]**

Price on Expiry Date	Call Option 1 [Buy]				Call Option 2 [Sell]				Call Option 3 [Buy]				Net Pay Off
	EP_1	P_{C1}	Action	Pay Off	EP_2	P_{C2}	Action	Pay Off	EP_3	P_{C3}	Action	Pay Off	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14) = (5) +(9)+(13)
95	100	20	Lapse	(20)	110	15	Lapse	30	120	12	Lapse	(12)	(2)
100	100	20	Lapse	(20)	110	15	Lapse	30	120	12	Lapse	(12)	(2)
105	100	20	Exercise	(15)	110	15	Lapse	30	120	12	Lapse	(12)	3
110	100	20	Exercise	(10)	110	15	Lapse	30	120	12	Lapse	(12)	8
115	100	20	Exercise	(5)	110	15	Exercise	20	120	12	Lapse	(12)	3
120	100	20	Exercise	0	110	15	Exercise	10	120	12	Lapse	(12)	(2)
125	100	20	Exercise	5	110	15	Exercise	0	120	12	Exercise	(7)	(2)
130	100	20	Exercise	10	110	15	Exercise	(10)	120	12	Exercise	(2)	(2)
135	100	20	Exercise	15	110	15	Exercise	(20)	120	12	Exercise	3	(2)

Note: Pay off: Based on action on the date of expiry —

Action	Call Option 1 (Call Holder)	Call Option 2 (Call Writer)
Lapse	Inflow: None Less Outflow: Premium (Col.3 / 11)	Inflow: Premium (Col.7) Less Outflow: None [2 X Value obtained above]
Exercise	Inflow: Price on Expiry Date (Col.1) Less Outflow: Exercise Price (Col.2/10) Premium (Col.3/11)	Inflow: Premium (Col.7) Exercise Price (Col.6) Less Outflow: Price on Expiry Date (Col.1) [2 X Value obtained above]

(b) Pay Off Graph



2. Buying Two Calls at EP2, Writing One Call each at EP1 and EP3

(a) Computation of Net Pay off [Figures in ₹]

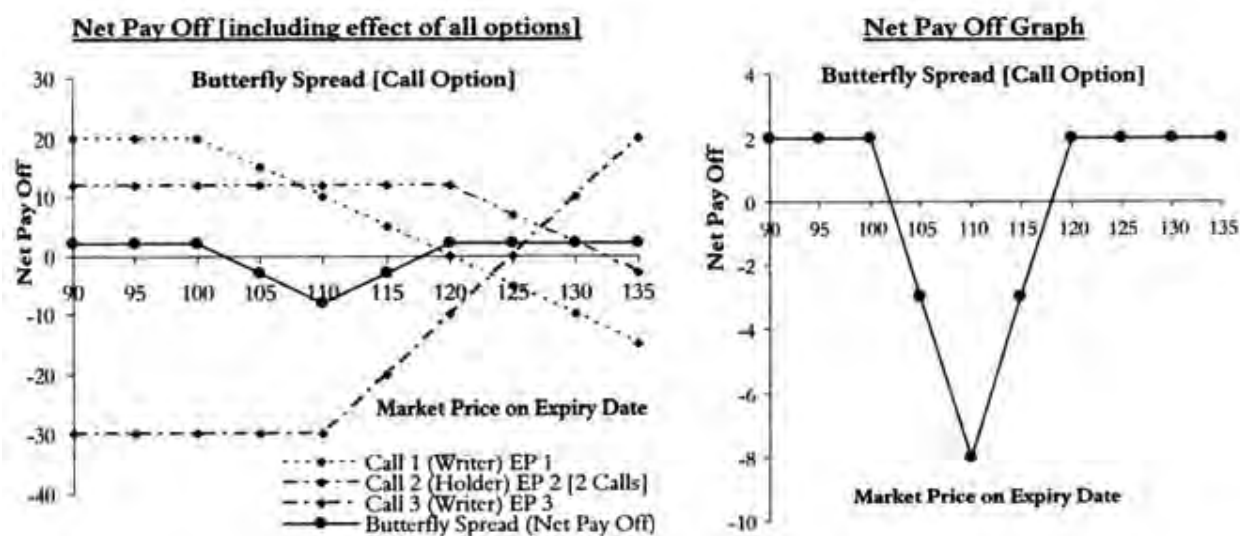
Price on Expiry Date	Call Option 1 [Sell]				Call Option 2 [Buy]				Call Option 3 [Sell]				Net Pay Off
	EP ₁	P _{c1}	Action	Pay Off	EP ₂	P _{c2}	Action	Pay Off	EP ₃	P _{c3}	Action	Pay Off	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14) = (5) + (9) + (13)
90	100	20	Lapse	20	110	15	Lapse	(30)	120	12	Lapse	12	2
95	100	20	Lapse	20	110	15	Lapse	(30)	120	12	Lapse	12	2
100	100	20	Lapse	20	110	15	Lapse	(30)	120	12	Lapse	12	2
105	100	20	Exercise	15	110	15	Lapse	(30)	120	12	Lapse	12	(3)
110	100	20	Exercise	10	110	15	Lapse	(30)	120	12	Lapse	12	(8)
115	100	20	Exercise	5	110	15	Exercise	(20)	120	12	Lapse	12	(3)
120	100	20	Exercise	0	110	15	Exercise	(10)	120	12	Lapse	12	2
125	100	20	Exercise	(5)	110	15	Exercise	0	120	12	Exercise	7	2
130	100	20	Exercise	(10)	110	15	Exercise	10	120	12	Exercise	2	2
135	100	20	Exercise	(15)	110	15	Exercise	20	120	12	Exercise	(3)	2



Action	Call Option 1 (Call Holder)	Call Option 2 (Call Writer)
Lapse	Inflow: None Less Outflow: Premium (Col.7) [2 X Value obtained above]	Inflow: Premium (Col.3/11) Less Outflow: None
Exercise	Inflow: Price on Expiry Date (Col.I) Less Outflow: Exercise Price (Col.6) Premium (Col.7) [2 X Value obtained above]	Inflow: Premium (Col.3/11) Exercise Price (Col.3/11) Less Outflow: Price on Expiry Date (Col.I)

Note : Pay off: Based on Action on the date of expiry -

(b) Pay of Graph



D. BUTTERFLY SPREAD USING PUT OPTIONS

1. Writing Two Puts at EP2, Buying One Put each at EP1 and EP3

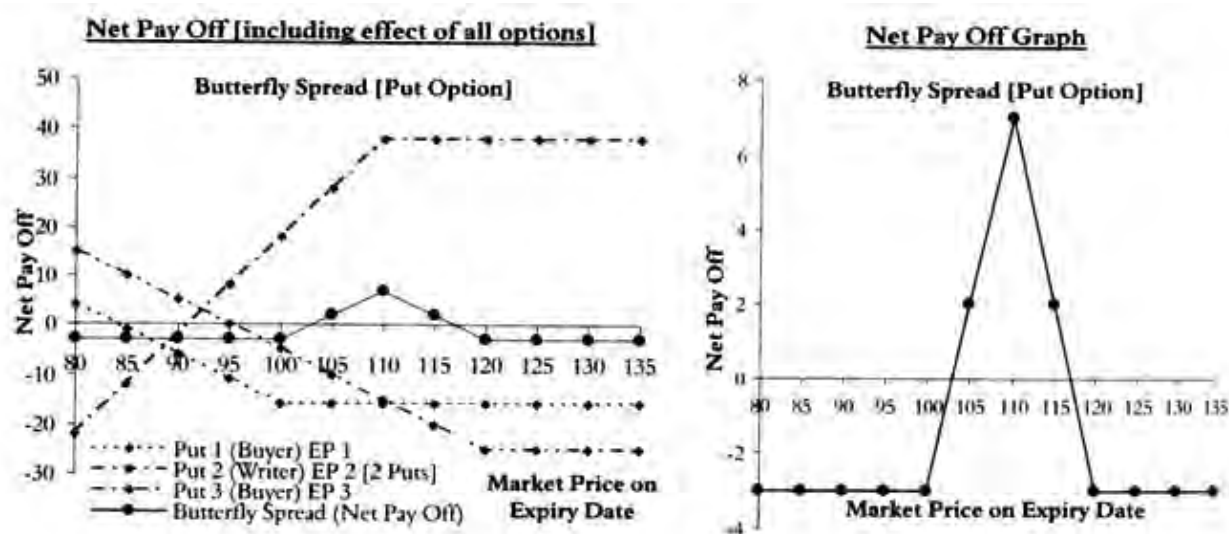
(a) Computation of Net Pay Off [Figures in ₹]

Price on Expiry Date	Put Option 1 [Buy]				Call Option 2 [Buy]				Call Option 3 [Sell]				Net Pay Off
	EP ₁	P _{P1}	Action	Pay Off	EP ₂	P _{P2}	Action	Pay Off	EP ₃	P _{P3}	Action	Pay Off	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14) = (5) + (9) + (13)
80	100	16	Exercise	4	110	19	Exercise	(22)	120	25	Exercise	15	(3)
85	100	16	Exercise	(1)	110	19	Exercise	(12)	120	25	Exercise	10	(3)
90	100	16	Exercise	(6)	110	19	Exercise	(2)	120	25	Exercise	5	(3)
95	100	16	Exercise	(11)	110	19	Exercise	8	120	25	Exercise	0	(3)
100	100	16	Lapse	(16)	110	19	Exercise	18	120	25	Exercise	(5)	(3)
105	100	16	Lapse	(16)	110	19	Exercise	28	120	25	Exercise	(10)	2
110	100	16	Lapse	(16)	110	19	Lapse	38	120	25	Exercise	(15)	7
115	100	16	Lapse	(16)	110	19	Lapse	38	120	25	Exercise	(20)	2
120	100	16	Lapse	(16)	110	19	Lapse	38	120	25	Lapse	(25)	(3)
125	100	16	Lapse	(16)	110	19	Lapse	38	120	25	Lapse	(25)	(3)

Note: Pay off: Based on action on the date of expiry —

Action	Put Option 1 (Put Holder)	Put Option 2 (Put Writer)
Lapse	Inflow: None Less Outflow: Premium (Col.3/11)	Inflow: Premium (Col.7) Less Outflow: None [2 X Value obtained above]
Exercise	Inflow: Exercise Price (Col.2/10) Less Outflow: Price on Expiry Date (Col.1) Premium (Col.3/11)	Inflow: Premium (Col.7) Price on Expiry Date (Col.1) Less Outflow: Exercise Price (Col.6) [2 X Value obtained above]

(b) Pay Off Graphs



2. Buying Two Puts at EP₂, Selling One Put each at EP₁ and EP₃

(a) Computation of Net Pay Off [Figures in ₹]

Price on Expiry Date	Put Option 1 [Sell]				Put Option 2 [Buy]				Put Option 3 [Sell]				Net Pay Off
	EP ₁	P _{P1}	Action	Pay Off	EP ₂	P _{P2}	Action	Pay Off	EP ₃	P _{P3}	Action	Pay Off	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14) = (5) + (9) + (13)
80	100	16	Exercise	(4)	110	19	Exercise	22	120	25	Exercise	(15)	3
85	100	16	Exercise	1	110	19	Exercise	12	120	25	Exercise	(10)	3
90	100	16	Exercise	6	110	19	Exercise	2	120	25	Exercise	(5)	3
95	100	16	Exercise	11	110	19	Exercise	(8)	120	25	Exercise	0	3
100	100	16	Lapse	16	110	19	Exercise	(18)	120	25	Exercise	5	3
105	100	16	Lapse	16	110	19	Exercise	(28)	120	25	Exercise	10	(2)
110	100	16	Lapse	16	110	19	Exercise	(38)	120	25	Exercise	15	(7)
115	100	16	Lapse	16	110	19	Exercise	(38)	120	25	Exercise	20	3
120	100	16	Lapse	16	110	19	Exercise	(38)	120	25	Exercise	25	3



125	100	16	Lapse	16	110	19	Exercise	(38)	120	25	Exercise	25	3
130	100	16	Lapse	16	110	19	Exercise	(38)	120	25	Exercise	25	3
135	100	16	Lapse	16	110	19	Exercise	(38)	120	25	Exercise	25	3

Note: Pay Off: Based on action on the date of expiry-

Action	Put Holder	Put Writer
Lapse	Inflow: None Less: Outflow: Premium (Col.7) [2×Value obtained above	Inflow: Premium (Col. 3/11) Less: Outflow: None
Exercise	Inflow: Exercise Price (Col.6) Less: Outflow: Price on Expiry Date (Col.1) Premium (Col.7)	Inflow: Premium (Col.3/11) Price on Expiry Date (Col.1) Less: Outflow: Exercise Price (Col.2/10)

(b) Pay Off Graphs

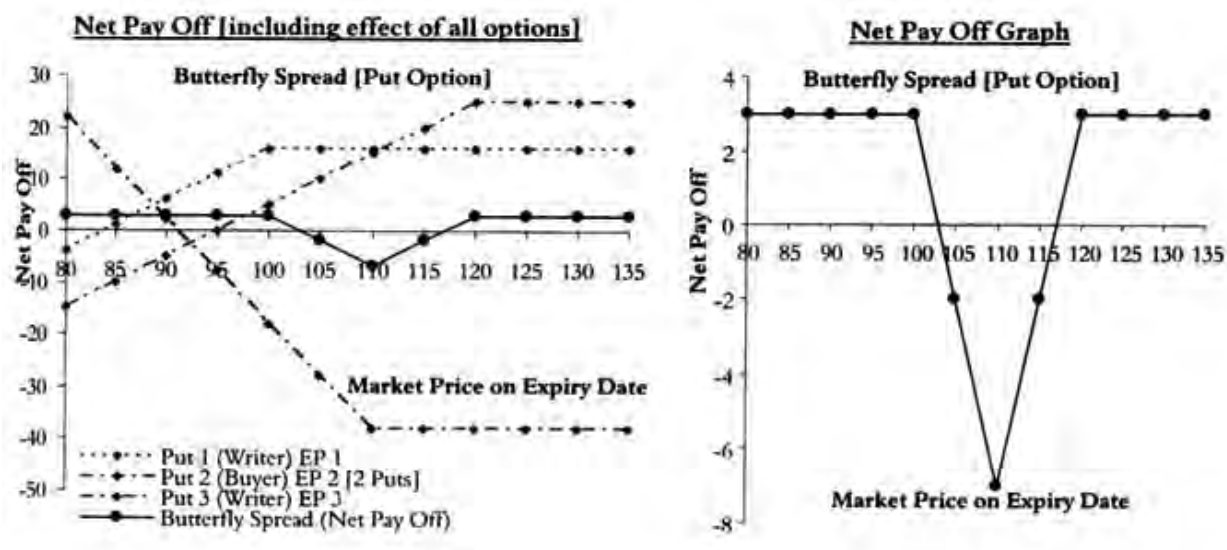


Illustration 41.

Bharat Aluminum Co., an Indian Company, has expressed its intention to acquire a Hungary based Electrical Goods Manufacturing Company at a price significantly higher than the Hungarian Company's market price.

Market sentiments are way ward.

Some feel that the acquisition would be good for Balco, while others feel that at such a high purchase price, DFL may end up in loss.

Analysts expect the stock prices to be volatile for the next six months atleast, till the results of the Hungarian Company are published. Presently shares of Balco are trade at ₹480.

Vicky, an investor, wants to know if there is any possibility making money in the given situation (extreme volatility, without any direction of movement), from the following information (options expiring in 4-Months) —

Exercise Price	Premium for Call Option	Premium for Put Option
₹500	₹50	₹60

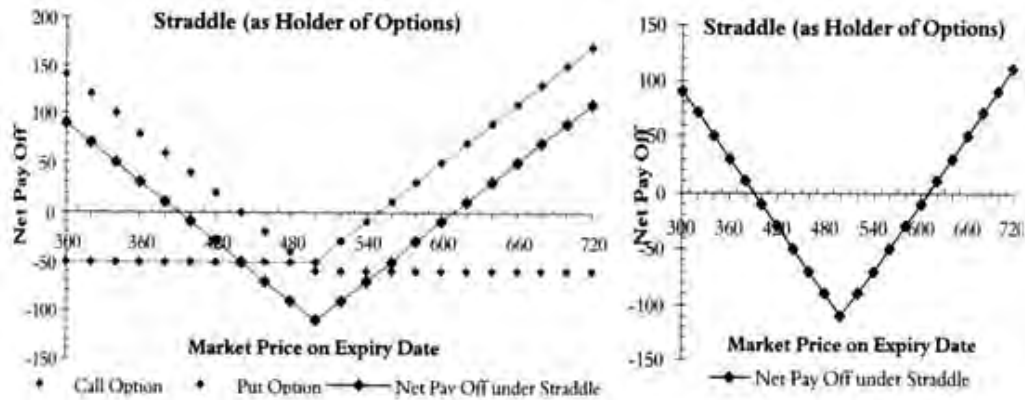
Solution:**A. Appropriate Strategy:**

- 1. Condition Prevalent and Outlook:** Extreme Volatility and uncertain future. Directionless movement in stock prices.
- 2. Appropriate Strategy:** Straddle —
 - (a) Long Straddle:** Buy a Call, Buy a Put; at the same Expiry Date (if the expected spot price on the date of expiry will be far away from the Strike Price)
 - (b) Short Straddle:** Write a Call, Write a Put; at the same Expiry Date (if the expected spot price on the expiry date is within certain limits on either side of the Strike Price)

B. Long Straddle**(Buying Call Option, Buying Put Option)****1. Pay Off Table:**

Price on Expiry Date	Call Options				Put Options				Net Pay Off
	Exercise Price	Premium	Action	Pay Off	Exercise Price	Premium	Action	Pay Off	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
300	500	50	Lapse	(50)	500	60	Exercise	140	90
320	500	50	Lapse	(50)	500	60	Exercise	120	70
340	500	50	Lapse	(50)	500	60	Exercise	100	50
360	500	50	Lapse	(50)	500	60	Exercise	80	30
380	500	50	Lapse	(50)	500	60	Exercise	60	10
400	500	50	Lapse	(50)	500	60	Exercise	40	(10)
420	500	50	Lapse	(50)	500	60	Exercise	20	(30)
440	500	50	Lapse	(50)	500	60	Exercise	0	(50)
460	500	50	Lapse	(50)	500	60	Exercise	(20)	(70)
480	500	50	Lapse	(50)	500	60	Exercise	(40)	(90)
500	500	50	Lapse	(50)	500	60	Lapse	(60)	(110)
520	500	50	Exercise	(30)	500	60	Lapse	(60)	(90)
540	500	50	Exercise	(10)	500	60	Lapse	(60)	(70)
560	500	50	Exercise	10	500	60	Lapse	(60)	(50)
580	500	50	Exercise	30	500	60	Lapse	(60)	(30)
600	500	50	Exercise	50	500	60	Lapse	(60)	(10)
620	500	50	Exercise	70	500	60	Lapse	(60)	10
640	500	50	Exercise	90	500	60	Lapse	(60)	30
660	500	50	Exercise	110	500	60	Lapse	(60)	50
680	500	50	Exercise	130	500	60	Lapse	(60)	70
700	500	50	Exercise	150	500	60	Lapse	(60)	90
720	500	50	Exercise	170	500	60	Lapse	(60)	110

2. Pay Off Graph:



Price on Expiry Date	Call Options				Put Options				Net Pay Off
	Exercise Price	Premium	Action	Pay Off	Exercise Price	Premium	Action	Pay Off	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
300	500	50	Lapse	50	500	60	Exercise	(140)	(90)
320	500	50	Lapse	50	500	60	Exercise	(120)	(70)
340	500	50	Lapse	50	500	60	Exercise	(100)	(50)
360	500	50	Lapse	50	500	60	Exercise	(80)	(30)
380	500	50	Lapse	50	500	60	Exercise	(60)	(10)
400	500	50	Lapse	50	500	60	Exercise	(40)	10
420	500	50	Lapse	50	500	60	Exercise	(20)	30
440	500	50	Lapse	50	500	60	Exercise	0	50
460	500	50	Lapse	50	500	60	Exercise	20	70
480	500	50	Lapse	50	500	60	Exercise	40	90
500	500	50	Lapse	50	500	60	Lapse	60	110
520	500	50	Exercise	30	500	60	Lapse	60	90
540	500	50	Exercise	10	500	60	Lapse	60	70
560	500	50	Exercise	(10)	500	60	Lapse	60	50
580	500	50	Exercise	(30)	500	60	Lapse	60	30
600	500	50	Exercise	(50)	500	60	Lapse	60	10
620	500	50	Exercise	(70)	500	60	Lapse	60	(10)
640	500	50	Exercise	(90)	500	60	Lapse	60	(30)
660	500	50	Exercise	(110)	500	60	Lapse	60	(50)
680	500	50	Exercise	(130)	500	60	Lapse	60	(70)
700	500	50	Exercise	(150)	500	60	Lapse	60	(90)
720	500	50	Exercise	(170)	500	60	Lapse	60	(110)

C. Short Straddle

(Writing Call Option, Writing Put Option)

1. Pay Off Table

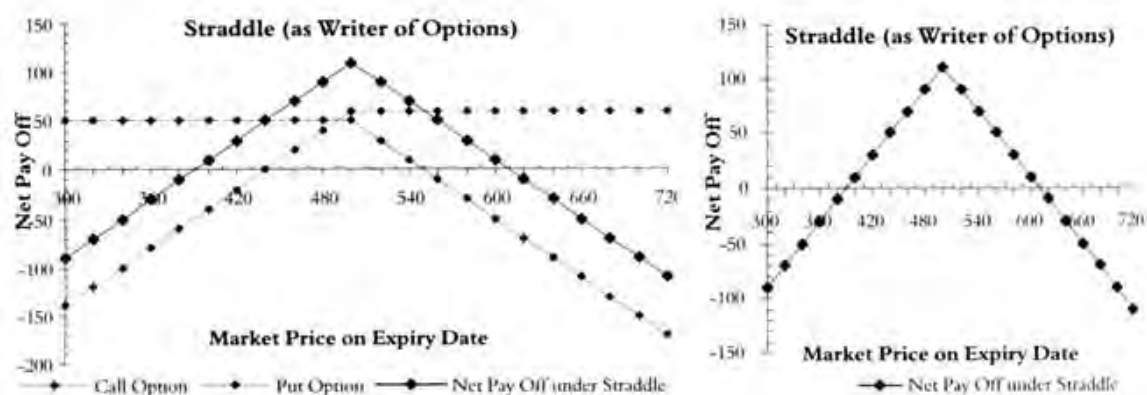


Illustration 42.

On 19th July following are the spot rates - Spot USD / EUR 1.20000 INR / USD

Following are the quotes of European Options;

Currency Pair	Call/Put,	Strike Price	Premium	Expiry Date
USD/EUR	Call	1.2000	\$ 0.035	Oct. 19
USD/EUR	Put	1.2000	\$0.04	Oct.19
INR/USD	Call	44.8000	Re.0.12	Dec. 19
INR/USD	Put	44.8000	Re.0.04	Dec.19

- A Trader sells an At-The-Money Spot Straddle expiring at three months (Oct. 19). Calculate the gain or loss if three months later the spot rate is USD / EUR 1.2900.
- Which strategy gives a profit to the dealer if five months later (Dec. 19) expected spot rate is INR / USD 45.00. Also calculate profit for a transaction of USD 1.40 Millions.

Solution:

1. Straddle Strategy - At the Money - Profit or Loss Calculation

Straddle is an Option Strategy which involves buying / writing a call and put with the same strike price and same expiry date. A trader sells a Straddle, will be selling a Call option & a put option with Strike Price of USD 1.2000 per EUR.

2. Computation of Net Pay-Off

Particulars	Amount
Exercise Price	\$1.2000
Spot Price as on Exercise Date	\$1.2900
Action of the Buyer of the Options	Call - Exercise Put - Lapse
Loss on Call Option to the WRITER = Strike Price - Exercise Price	\$0.0900
Total Options Premium inflow to the WRITER = \$0,035 + \$ 0.040	\$0.0750
Net Loss	\$0.0150



3. Increase in Prices - Strategy

As Expected Future price is higher, purchase of call option is beneficial. (Otherwise, put option may be sold).

Course of Action -

- Contract Date: 19th July: Pay Premium for USD 14,00,000 @ ₹ 0.12 per USD = INR 1,68,000.
- Exercise Date: 19th December: Exercise Call - Gain = 14,00,000 X ₹ (45.00 - 44.80) = INR 2,80,000.
- Net Gain or Profit = (1) - (2) = INR 1,12,000.

Illustration 43.

Fund Managers anticipate a big move in the stock of Bikram Ltd. Anup of ABC Fund believes such change to be upwards, while Shyam of Premier Fund holds the opposite view.

From the following information made available no Bikram Ltd, explain what action will Anup and Shyam take and why?

Exercise Price	Premium for Call Option	Premium for Put Option
₹100	₹15	₹10

Solution:

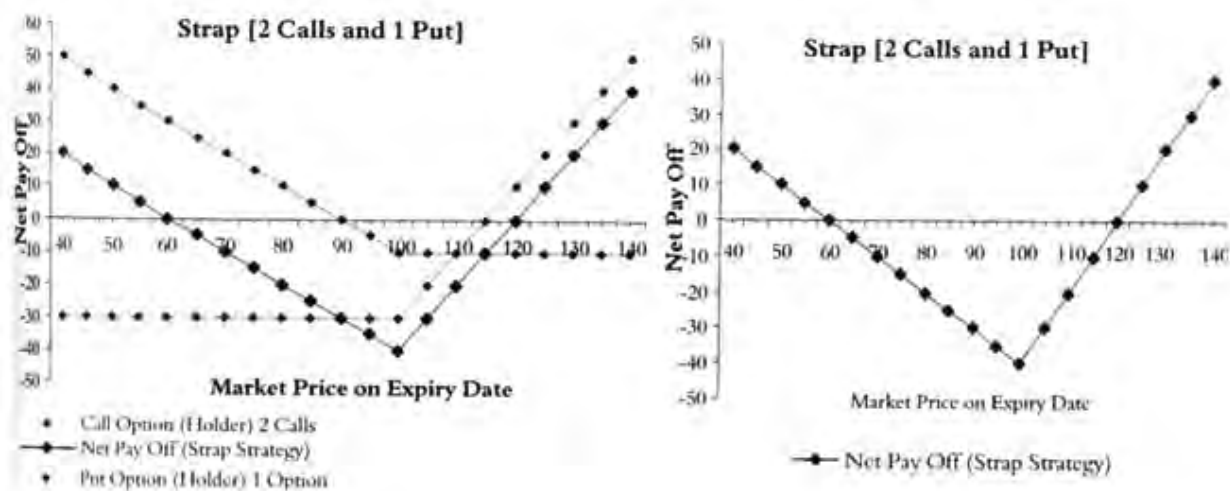
A. Anup, ABC Fund Choice of Strategy:

- Outlook:** Extreme Volatility and uncertain future. Stock of Bikram Ltd expected to appreciate i.e. Bullish on Bikram.
- Strategy:** Creation of Strap i.e. Buying Two Calls, Buying One Put
- Why?** Increase in price is more likely than decrease, therefore two calls would yield better results. Put option is bought to cash in if stock of Bikram spirals downwards.

1. Pay off Table:

Price on Expiry Date	Call Option [2 Options]				Put Option [1 Option]				Net Pay off
	Ex. Price	Premium	Action	Payoff	Ex. Price	Premium	Action	Payoff	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10) = (5) + (9)
40	100	15	Lapse	(30)	100	10	Exercise	50	20
50	100	15	Lapse	(30)	100	10	Exercise	40	10
60	100	15	Lapse	(30)	100	10	Exercise	30	0
70	100	15	Lapse	(30)	100	10	Exercise	20	(10)
80	100	15	Lapse	(30)	100	10	Exercise	10	(20)
90	100	15	Lapse	(30)	100	10	Exercise	0	(30)
100	100	15	Lapse	(30)	100	10	Lapse	(10)	(40)
110	100	15	Exercise	(10)	100	10	Lapse	(10)	(20)
120	100	15	Exercise	10	100	10	Lapse	(10)	0
130	100	15	Exercise	30	100	10	Lapse	(10)	20
140	100	15	Exercise	50	100	10	Lapse	(10)	40

2. Pay off Graphs:



B. Shyam, Premier Fund 1. Choice of Strategy:

- Outlook:** Extreme Volatility and uncertain future. Stock of Shyam Premier Fund expected to depreciate i.e. Bearish on Shyam.
- Strategy:** Creation of Strip i.e. Buying Two Puts, Buying One Call.
- Why?** Decrease in price is more likely than increase; therefore two puts would yield better results as prices go down. One Call option is bought to cash in if stock of Shyam spirals upwards.

3. Pay off Table:

Price on Expiry Date	Call Option [1 Option]				Put Option [2 Options]				Net Pay off
	Ex. Price	Premium	Action	Payoff	Ex. Price	Premium	Action	Payoff	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10) = (5) + (9)
40	100	15	Lapse	(15)	100	10	Exercise	100	85
50	100	15	Lapse	(15)	100	10	Exercise	80	65
60	100	15	Lapse	(15)	100	10	Exercise	60	45
70	100	15	Lapse	(15)	100	10	Exercise	40	25
80	100	15	Lapse	(15)	100	10	Exercise	20	5
90	100	15	Lapse	(15)	100	10	Exercise	0	(15)
100	100	15	Lapse	(15)	100	10	Lapse	(20)	(35)
110	100	15	Exercise	(5)	100	10	Lapse	(20)	(25)
120	100	15	Exercise	5	100	10	Lapse	(20)	(15)
130	100	15	Exercise	15	100	10	Lapse	(20)	(5)
140	100	15	Exercise	25	100	10	Lapse	(20)	5

4. Pay off Graphs



Illustration 44.

Mr. Khan established the following spread on the Delta Corporation's stock:

- Purchased one 3-month call option with a premium of ₹20 and an exercise price of ₹550.
- Purchased one 3-month put option with a premium of ₹10 and an exercise price of ₹450.

Delta Corporation's stock is currently selling at ₹500. Determine profit or loss, if the price of Delta Corporation's:

- remains at ₹500 after 3 months.
- falls at ₹350 after 3 months.
- rises to ₹600.

Assume the size option is 100 shares of Delta Corporation.

Solution:

1. Pay off for Call Option

Spot Price (1)	Exercise Price (2)	Action (3)	Gross Value (4) = (2) - (1)	Net Pay-Off (5) = (4) — Premium of ₹30
350	550	Lapse	Nil	(20)
500	550	Lapse	Nil	(20)
600	550	Exercise	50	30

2. Pay off for Put Option

Spot Price (1)	Exercise Price (2)	Action (3)	Gross Value (4) = (2) - (1)	Net Pay-Off (5) = (4) — Premium of ₹10
350	450	Exercise	100	90
500	450	Lapse	Nil	(10)
600	450	Lapse	Nil	(10)

3. Net Payoff Table

Spot Price (1)	Net Payoff in Call Option (2)	Net Payoff in Put Option (3)	Total (4)	No. of Options (5)	Net Profit of Spread (6)=4X5
350	(20)	90	70	100	7,000
500	(20)	(10)	(30)	100	(3,000)
600	30	(10)	20	100	2,000

Illustration 45.

Ascertain the value of Call Options expiring one year later, of four securities from the following information—

Stock	Current Spot Price	Exercise Price	Expected Price One Year Later
X Ltd	₹1,020	₹1,050	₹1,100
Y Ltd	₹200	₹180	₹220
Z Ltd	₹500	₹510	₹535
D Ltd	₹80	₹80	₹90

Risk Free Rate may be assumed at 10% for continuous discounting. Also show in case of Security Z, how choosing the Stock Route and Option Route with Risk Free Investment will have the same wealth for an investor at the end of the for the same cash outgo.

Solution:

1. Computation of Value of Call

Stock	Current Spot Price [SP ₀]	Exercise Price [EP]	PV of EP [EP X e ^{-1x0.10}] EP - r e ^{0.10}	Value of Call Option [SP ₀ - PV of EP]
(1)	(2)	(3)	(4)	(5) = (2)-(4)
X	₹1,020	₹1050	₹1050 ÷ 1.1052 = ₹950.05	₹1,020 - ₹950.05 = ₹69.95
Y	₹200	₹180	₹180 ÷ 1.1052 = ₹162.87	₹200 - ₹162.87 = ₹37.13
Z	₹500	₹510	₹510 ÷ 1.1052 = ₹461.45	₹500 - ₹461.45 = ₹38.55
D	₹80	₹80	₹80 ÷ 1.1052 = ₹72.39	₹80 - ₹72.39 = ₹7.61

2. Case of Stock of Z Ltd

Action on Stock Route	Action on Option Plus Risk Free Return Route
Now: Buy Stock of Z at ₹500.	Now: - Invest Present Value (i.e. ₹461.45) of Exercise Price at Risk Free Rate of 10% (continuous compounding) - Buy Call Option at ₹38.55 (Strike Price of ₹510) - Total Cash Outgo = ₹461.45 + ₹38.55 = ₹500



1 Year Later: Net Worth = Value per Share at Expected Future Spot Rate = ₹530	1 Year Later: - Net Worth = Maturity Value of Risk Free Investment + Value of Call Option - Maturity Value of Risk Free Investment = $₹461.45 \times e^{0.01} = \text{₹510}$ - Value of Call Option (on Expiry) = Gain on Exercise of Option = Spot Price on Expiry Date Less Exercise Price = $₹535 - ₹510 = \text{₹25}$ Net Worth = $₹510 + ₹25 = \text{₹535}$

Illustration 46.

Ascertain the value of Options expiring one year later, for the following securities —

- ABC Ltd (ABCL) is quoted at ₹110. At the end of 3 Months, the stock price will either be ₹100 or ₹150. Exercise price is ₹120.
- 3-Month Options on MN Ltd (MNL) carry an exercise price of ₹350. Stock Price is expected to be ₹250 or ₹450. Presently the shares are traded for ₹380

Risk Free Rate may be assumed at 12% for continuous discounting.

Solution:

1. ABC Ltd

(a) Basic Data

Particulars	₹
Stock Price (SP_0)	110
Exercise Price (EP)	120
Expected Future Spot Price on Expiry Date	
• Future Price 1 [FP_1]	100
• Future Price 2 [FP_2]	150

(b) Computation of Option Delta:

Particulars	FP_1	FP_2
Future Spot Price	100	150
Position on Expiry Date (in comparison with Exercise Price)	Out of Money	In the Money
Action on Expiry Date	Lapse	Exercise
Value of Option on Expiry [Future Spot Price Less Exercise Price]	—	₹30 [150-120]

Option Delta = Change in Value of Option ÷ Change in Future Spot Price

$$= (\text{₹}30 - 0) \div (\text{₹}150 - \text{₹}100) = \text{₹}30/\text{₹}50 = 0.60$$

(c) Computation of Amount to be Invested at Risk Free Rate:

= Present Value of Lower Band of Future Spot Price i.e. FP_1

= Present Value of ₹100 discounted at 12% Continuous Compounding for a 3-Month Period

$$= ₹100 \times e^{-rt} = ₹100 \div e^{rt}$$

$$= ₹100 \div e^{0.12 \times 0.25} = ₹100 \div 1.0305 = ₹97.04$$

(d) Value of Call [C]

= Option Delta X [Current Stock Price Less Amount to be invested at Risk Free Rate]

$$= 0.60 \times (₹110 - ₹97.04) = 0.60 \times ₹12.96 = ₹7.78$$

(e) Value of Put [P] (Under Put Call Parity):

→ Value of Call + Present Value of Exercise Price = Current Spot Price + Value of Put

$$\rightarrow C + EP \times e^{-rt} = SP_0 + P$$

$$\rightarrow ₹7.78 + (₹120 \div 1.0305) = ₹110 + P$$

$$\rightarrow P = ₹7.78 + ₹116.45 - ₹120 = ₹15.33$$

2. MN Limited Particulars**(a) Basic Data**

Particulars	₹
Stock Price (SP_0)	380
Exercise Price (EP)	350
Expected Future Spot Price on Expiry Date	
• Future Price 1 [FP_1]	250
• Future Price 2 [FP_2]	450

(b) Computation of Option Delta

Particulars	FP_1	FP_2
Future Spot Price	250	450
Position on Expiry Date (in comparison with Exercise Price)	Out of Money	In the Money
Action on Expiry Date	Lapse	Exercise
Value of Option on Expiry [Future Spot Price Less Exercise Price]	₹0	₹100 [450 - 350]

Option Delta = Change in value of options ÷ Change in future spot Price

$$= (₹100 - 0) \div (₹450 - ₹250) = ₹100 / ₹200 = 0.50$$

(c) Computation of Amount to be Invested at Risk Free Rate:

= Present Value of Lower Band of Future Spot Price i.e. FP_1

= Present Value of ₹250 discounted at 12% Continuous Compounding for a 3-Month Period

$$= ₹250 \times e^{-rt} = ₹250 \div e^{rt}$$

$$= ₹250 \div e^{0.12 \times 0.25} = ₹250 \div 1.0305 = ₹242.60$$

(d) Value of Call [C]

= Option Delta X [Current Stock Price Less Amount to be invested at Risk Free Rate]

$$= 0.50 \times (₹380 - ₹242.60) = 0.50 \times ₹137.40 = ₹68.70$$

**(e) Value of Put [P] (Under Put Call Parity):**

→ Value of Call + Present Value of Exercise Price = Current Spot Price + Value of Put

→ $C + EP \times e^{-rt} = SP_0 + P$

→ ₹68.70 + (₹350 ÷ 1.0305) = ₹380 + P

→ $P = ₹68.70 + ₹339.64 - ₹380 = ₹28.34$.

Illustration 47.

Soumo has ₹3,00,000 to invest in the Capital Market. He considers stock of Kraft Components Ltd, an auto mobile industry ancillary unit, to be a safe bet. KCL is currently traded at ₹200. Industry analysts say opine that KCL will either remain at ₹190 or go upto ₹250 in 6-Months time, considering the performance of the industry. Soumo views this as an opportunity and has decided to invest ₹3,00,000 to buy shares of KCL and earn a maximum of upto 25%, which is more than the risk free rate.

His actuarial friend, Rakesh, also has ₹3,00,000 to invest. However, he considers Soumo's proposition to be bitrisky. Having some knowledge on options, Rakesh intends to buy calls and invest at Risk Free Rate of 12%. 6-Months option carries an Exercise Price of ₹220.

What should be the price of the call, for Rakesh's proposition to yield the same result 6-months later (i.e. a minimum net wealth of ₹3,00,000)? How many calls should Rakesh buy?

Who would be better off at the end of 6-Months, if the actual spot price is ₹180, ₹250 and ₹300?

Solution:**1. Basic Data**

Particulars	₹
Current Stock Price (SP_0)	200
Exercise Price (EP)	220
Expected Future Spot Price on Expiry Date	
• Future Price 1 [FP_1]	190
• Future Price 2 [FP_2]	250

2. Computation of Option Delta:

Particulars	FP_1	FP_2
Future Spot Price	190	250
Position on Expiry Date (in comparison with Exercise Price of ₹220)	Out of Money	In the Money
Action on Expiry Date	Lapse	Exercise
Value of Option on Expiry [Future Spot Price Less Exercise Price]	₹0	₹30 [250 - 220]

Option Delta = Change in Value of Option ÷ Change in Future Spot Price

= (₹30 - ₹0) ÷ (₹250 - ₹190) = ₹30 / ₹60 = 0.50

3. Computation of Amount to be Invested at Risk Free Rate:

= Present Value of Lower Band of Future Spot Price i.e. FP_1

= Present Value of ₹190 discounted at 12% Continuous Compounding for a 6-Month Period

$$\begin{aligned}
&= ₹190 \times e^{-rt} = ₹190 \div e^{rt} \\
&= ₹190 \div e^{0.12 \times 0.5} \\
&= ₹190 \div e^{0.06} \\
&= ₹190 \div 1.0618 = ₹178.94
\end{aligned}$$

4. Value of Call [C]

$$\begin{aligned}
&= \text{Option Delta} \times [\text{Current Stock Price Less Amount to be invested at Risk Free Rate}] = 0.60 \times (₹200 - 178.94) \\
&= 0.60 \times ₹21.06 = ₹12.636
\end{aligned}$$

5. Value of Put [P] (Under Put Call Parity):

→ Value of Call + Present Value of Exercise Price = Current Spot Price + Value of Put

$$\rightarrow C + EP \times e^{-rt} = SP_0 + P$$

$$\rightarrow ₹12.636 + (₹220 \div 1.0618) = ₹200 + P$$

$$\rightarrow P = ₹12.636 + ₹207.20 - ₹200 = ₹19.836$$

6. No. of Calls to be Bought by Ritesh:

$$= (1 \div \text{Options Delta}) \text{ per share of KCL}$$

$$= 1 / 0.50 = 2 \text{ per share of KCL or 5 Calls for every 3 Shares of KCL}$$

7. No. of Shares that can be bought = ₹3,00,000 ÷ ₹200 per share (CMP) = 1,500 shares**8. Position 6-Months Later:****(a) Soumo**

Particulars •	Case A	Case B	Case C
Closing Net Worth = Actual Stock Price after 6 Months	₹180 x 1500 Shares = ₹2,70,000	₹250 X 1500 Shares = ₹3,75,000	₹300 x 1500 Shares = ₹4,50,000
Opening Net Worth = Purchase Price of Stock/ Initial Investment	₹200 x 1500 Shares = ₹3,00,000	₹200 X 1500 Shares = ₹3,00,000	₹200 x 1500 Shares = ₹3,00,000
Change	(₹30,000)	₹75,000	₹1,50,000
% Change	(10%) [(30)/300]	25% [75 ÷ 300]	50% [150 ÷ 300]
Inference	Erosion in Wealth	Increase in Wealth	Increase in Wealth

(b) Naren

Outflow per set of 5 Calls on KCL and Investment of ₹178.94 in Risk Free Rate per Share for 3 shares:

Particulars	Value
Outflow towards Purchase of Calls Out-flow towards Investment	5 Call's X ₹12.636 per Call 3 Shares of KCL X ₹178.94
Total Investment per set of 5 Calls and Risk Free Investment	₹600.00
Total Number of Portfolio Sets invested	₹3,00,000 ÷ ₹600
Total No. of Calls	500 Sets X 5 Calls per Set
Total amount invested in Risk Free Rate	500 Sets x ₹536.82



Particulars	Case A	Case B	Case C
Actual Closing Price per Share	₹180	₹250	₹300
Exercise Price	₹220	₹220	₹220
Position	Out of Money	In the Money	In the Money
Action	Lapse	Exercise	Exercise
Value of Call before Expiry	₹0	₹30 [₹250 - ₹220]	₹80 [₹300 - ₹220]
No. of Calls	2500	2500	2500
Total Value of Calls on Expiry [6-Months later] [A]	₹NIL [2500 X ₹0]	₹75,000 [2500 X ₹30]	₹2,00,000 [2500 x ₹80]
Maturity Value of Investment [Investment ₹2,68,410 X $c^{0.12 \times 0.5}$] [B]	₹2,85,000 [2,68,410 x 1.0618]	₹2,85,000 [2,68,410 x 1.0618]	₹2,85,000 [2,68,410 x 1.0618]
Closing Net Worth [A + B]	₹2,85,000	₹3,60,000	₹4,85,000
Opening Investment	₹3,00,000	₹3,00,000	₹3,00,000
Change	₹(15,000)	₹60,000	₹1,85,000
% Change	(5)% (15,000 ÷ 3,00,000)	20% [60 ÷ 300]	61.67% [185 ÷ 300]
Inference [Ignoring Time Value of Money]	Decrease in wealth	Increase in Wealth	Increase in Wealth

Conclusion:

- Rakesh will be better off when actual market price is either ₹250 or ₹300.
- Risk is neutralized in case of Rakesh by going in for the Options.

Illustration 48.

Stock of Kamla Woodwork is currently quoted at ₹110. In three months time it could either be ₹90 or ₹135. Ascertain the value of Call Option with an exercise price of ₹120 if the risk free rate of return is 8%.

Solution:

1. Basic Data

Factor	Notation	Value
Spot Price	SP_0	₹110
Exercise Price	EP	₹120

Expected Future Spot Price — Lower Limit [FP_1]	FP_1	₹90
Expected Future Spot Price — Higher Limit [FP_2]	FP_2	₹135
Value of Call at Lower Limit [Action = Lapse, since $FP_1 < EP$. Therefore Value is ₹NIL]	C_d	₹NIL
Value of Call at Upper Limit [Action = Exercise, since $FP_2 > EP$. Therefore Value is $FP_2 - EP = ₹135 - ₹120$]	C_u	₹15
Extent of Lower Limit of Future Spot Price [FP_1] on Current Price [SP_0] [FP_1 / SP_0] = ₹90/₹110	d	0.82
Extent of Upper Limit of Future Spot Price [FP_2] on Current Price [SP_0] [FP_2 / SP_0] = ₹135/₹110	u	1.27
Risk Free Rate of Return	r	8%
Tenor of Options Contract [in Years] = 3 Months/ 12 Months	t	0.25
Future Value Factor [Continuous Compounding Factor] = $e^{0.08 \times 0.25}$	f	1.0202

2. Alternative 1 [Formula Method]

$$C_u \left[\frac{f-d}{u-d} \right] + C_d \left[\frac{u-f}{u-d} \right] = \frac{₹15 \times \left[\frac{1.0202 - 0.82}{1.27 - 0.82} \right] + ₹0 \times \left[\frac{1.27 - 1.0202}{1.27 - 0.82} \right]}{1.0202}$$

$$= [₹15 \times (0.2002 / 0.45) + 0] / 1.0202$$

$$= ₹15 \times 0.4448 \div 1.0202 = ₹6.54$$

3. Alternative 2 [Decision Tree Method] [Requires Probability Values]

(a) Computation of Probability of FP_1 and FP_2 :

$$\text{Probability of Lower Limit } (FP_1) = (u - f) \div (u - d) = (1.25 - 1.0202) \div (1.25 - 0.80)$$

$$= 0.2498 \div 0.45$$

$$= 0.555$$

$$\text{Probability of Higher Limit } (FP_2) = 1 - 0.555$$

$$= 0.445$$

(b) Value of Option [Future Value of Option]

$$\text{Present Value of Call} = \text{Future Value} \times e^{-rt} \text{ or } \text{Future Value} \div e^{rt}$$

$$= ₹6.672 \div 1.0202 = ₹6.54$$

4. Alternative 3 [Table Method or Delta Route]

$$\text{Value of Call} = \text{No. of Shares per Call Option} \times [\text{Current Stock Price} - \text{Present Value of Lower Limit of Future Spot Price}]$$

$$= \text{Option Delta} \times [SP_0 - (FP_1 \times e^{-rt})]$$

$$= [(15 - 0) \div (135 - 90)] \times [110 - (90 \div 1.0202)]$$

$$= [(15/45)] \times [100 - 88.22] = 0.3333 \times 11.78 = ₹3.93$$

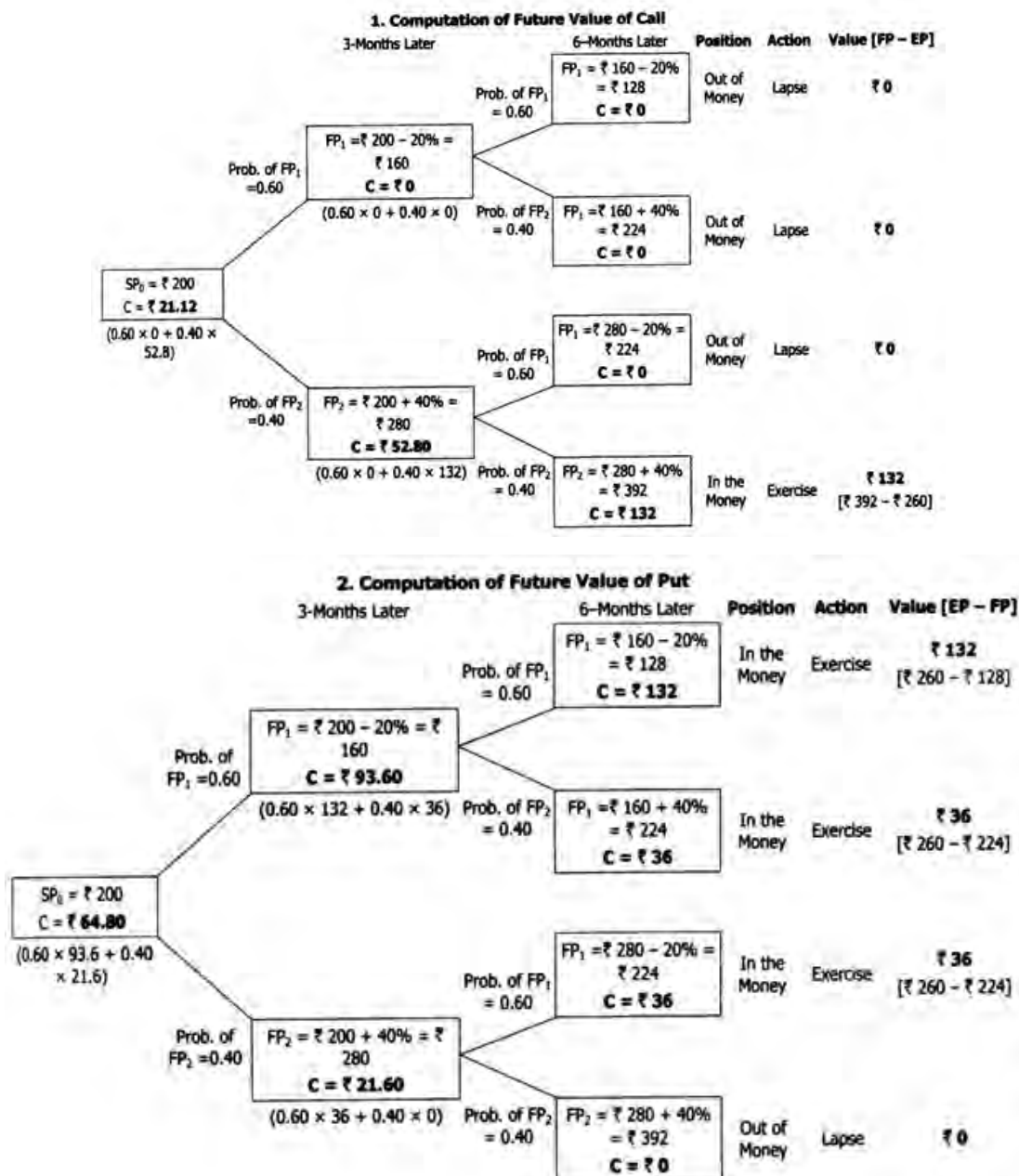
Illustration 49.

Nirmal Hydric Ltd. (NHL) is a newly listed Company. Its listing price today is ₹200. Though the industry offers much potential, there are no proven past track records.

Analysts expect the price of NHL to either to rise by 40% every half year or fall by 20% every half year (on the half yearly opening price), for the next one year, weightage being 40% for every increase and 60% for every fall.

If an One Year option carries a Exercise Price of ₹260, you required to compute the following under Binomial Model — (1) Risk Free Rate of Return, (2) Value of Call (Future Value and Present Value), (3) Value of Put (Future Value and Present Value)

Solution:



3. Computation of Risk Free Rate of Return Basic Data

Factor	Notation	Value
Spot Price	SP_0	₹200
Expected Future Spot Price — Lower Limit [FP_1]	FP_1	₹280
Expected Future Spot Price — Higher Limit [FP_1]	FP_2	₹160
Extent of Lower Limit of Future Spot Price [FP_1] on Current Price [SP_0] $FP_1/SP_0 = ₹160/ ₹200$	d	0.80
Extent of Upper Limit of Future Spot Price [FP_2] on Current Price [SP_0] $FP_2/SP_0 = ₹280 / ₹200$	u	1.40
Risk Free Rate of Return	r	To be ascer- tained
Tenor of Options Contract [in Years]	t	0.5

(a) Probability of Lower Limit (FP_1) = 0.60

$$\rightarrow 0.60 = (u - f) \div (u - d) = (1.40 - f) / (1.40 - 0.80) = (1.40 - f) / 0.60$$

$$\rightarrow 0.60 \times 0.60 = 1.40 - f$$

$$\rightarrow f = 1.40 - 0.36 = 1.04$$

$$\rightarrow e^{rt} = 1.04$$

$$\rightarrow e^{r \times 0.50} = 1.04 \text{ (Since per time slot = 6 Months or 0.25 Years)}$$

(b) Computation of Risk Free Rate:

From Natural Log Table, 1.04 is the value for 0.040

$$\rightarrow \text{Log} e^{0.5r} = \text{Log } 1.04$$

$$\rightarrow 0.5r = 0.0392$$

$$\rightarrow r = 0.0392 \div 0.5 = 0.0784 \text{ or } 7.84\% \text{ p.a.}$$

4. Present Value of Options

(a) Call Option: Future Value $\times e^{-rt}$, where $r = 7.84\%$ and $t = 1$ Year

$$= ₹21.12 \times e^{-0.0784}$$

$$= ₹21.12 \div e^{0.0784}$$

$$= ₹21.12 \div 1.0815$$

$$= ₹19.53$$

(b) Put Option: Future Value $\times e^{-rt}$, where $r = 7.84\%$ and $t = 1$ Year

$$= ₹64.80 \times e^{-0.0784} = ₹64.80 \div e^{0.0784} = ₹64.80 \div 1.0815 = ₹59.92$$

$$\text{Under Put Call Parity } P = C + \text{PV of EP} - SP_0$$

$$= 19.53 + (260 \div 1.0815) - 200 = 19.53 + 240.40 - 200 = ₹59.93$$

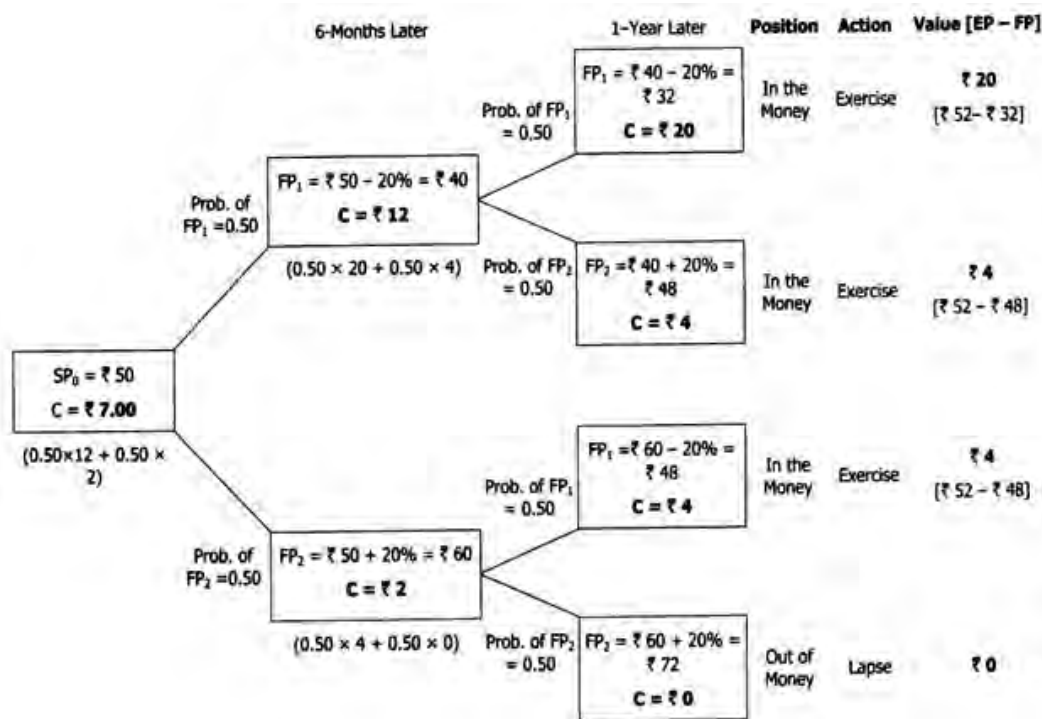
Illustration 50.

Stock of Agro Food Product Ltd. is currently priced at ₹50. It is known that in the first 6 months of current year from now prices will either rise by 20% or go down by 20%, further in the later half of the year prices may again go up by 20% or go down by 20% in the second step.



Suppose risk free interest rate is 5% continuous compounded, and strike rate is ₹52.
Calculate value of European Put Option.

Solution:



Value of Put Option

Put Option: Future Value $X e^{-rt}$ where $r = 5\%$ and $t = 1$ Year

$$\begin{aligned}
 &= ₹7 \times e^{-0.05 \times 1} \\
 &= ₹7 \div e^{0.05 \times 1} \\
 &= ₹7 \div 1.0513 \\
 &= ₹6.66
 \end{aligned}$$

Illustration 51.

A share price is currently priced ₹40, it is known that at end of one month, it will be either ₹38 or ₹42, the risk free interest rate is 8% per annum with continuous compounding. Find the value of a one - month European call option with a strike price of ₹39.5 with the help of Binomial and Risk Neutralization Model?

Solution:

Basic Data

Particulars	₹
Stock Price (SP_0)	40
Exercise Price (EP)	39.50
Expected Future Spot Price on Expiry Date	

• Future Price 1 [FP ₁]	42
• Future Price 2 [FP ₂]	38

1. Binomial Model

(a) Computation of Option Delta:

Particulars	FP ₁	FP ₂
Future Spot Price	42	38
Position on Expiry Date (in comparison with Exercise Price)	In the Money	Out of Money
Action on Expiry Date	Exercise	Lapse
Value of Option on Expiry [Future Spot Price Less Exercise Price]	₹2.50 [42 – 39.5]	0

Option Delta = Change in Value of Option ÷ Change in Future Spot Price

$$= (\text{₹}2.50 - \text{₹}0) \div (\text{₹}42 - \text{₹}38)$$

$$= \text{₹}2.50 / \text{₹}4$$

$$= \mathbf{0.625}$$

(b) Computation of Amount to be invested at Risk Free Rate:

= Present Value of Lower Band of Future Spot Price i.e. FP₂

= Present Value of ₹38 discounted at 8% Continuous Compounding for a 1-Month Period

$$= \text{₹}38 \times e^{-rt}$$

$$= \text{₹}38 \div e^{0.08 \times 1/12}$$

$$= \text{₹}38 \div 1.00702$$

$$= \mathbf{\text{₹}37.74}$$

(c) Value of Call [C]

= Option Delta X [Current Stock Price **Less** Amount to be invested at Risk Free Rate]

$$= 0.625 \times [40 - 37.74] = \mathbf{1.4125}$$

2. Risk Neutral Model

Particulars	Share
Current Spot Price (SP ₀)	₹40
Exercise Price (EP)	₹39.50
Future Spot Price 1 (FP ₁)	₹42
% Change (R ₁)	(42 - 40) / 40 = 5%
Position	In the Money
Action	Exercise
Value on Expiry (V _{C1})	FP ₁ - EP = ₹42 - ₹ 39.50 = ₹2.50
Future Spot Price 2 (FP ₂)	₹38
% Change (R ₂)	(38-40)/40 = (5%)



Position	Out of Money
Action	Lapse
Value on Expiry (V_{C1})	₹0
Probability of FP, [P_1]	X
Probability of FP [P_2]	1-x
Probability Values	Risk Free Return = $x \times \% \text{ Change for } FP_1 + [(1-x) \times \% \text{ Change for } FP_2]$ $\rightarrow 0.67\% = [x \times 5\%] + [(1-x) \times (5\%)]$ $\rightarrow 0.67 = 0.05x + [-0.05 + 0.05x]$ $\rightarrow 0.0067 = 0.05x - 0.05 + 0.05x$ $\rightarrow 0.0067 + 0.05 = 0.10x$ $\rightarrow P_1 = x = 0.0567 \div 0.10 = 0.567 \text{ or } 57\%$ $\rightarrow P_2 = 1 - x = 1 - 0.57 = 0.43 \text{ or } 43\%$
Value of Call [Future Value]	$\rightarrow (VQ \times P_1) + (VC_2 \times P_2)$ $\rightarrow (2.50 \times 0.57) + (0 \times 0.43) \rightarrow \text{₹1.425}$
Present Value of Call [C]	Value of Call $\times e^{-rt}$ $\rightarrow \text{₹1.425} \times e^{-0.08 \times 1/12}$ $\rightarrow \text{₹1.425} \div e^{0.0667}$ $\rightarrow \text{₹1.425} \div 1.00702 = \text{₹1.42}$

Illustration 52.

The shares of ITC Ltd., are currently price at ₹415 and call option exercisable in three month's time has an exercise rate of ₹400. Risk free interest rate is 5 % p.a and standard deviation (volatility) of share price is 22 %. Based on the assumption that ITC Ltd., is not going to declare any dividend over the next three months, is the option worth buying for ₹25?

- Calculate value of aforesaid call option based on Black Scholes valuation model if the current price is considered as ₹385.
- What would be the worth of put option if current price is considered ₹ 385.
- If ITC Ltd., share price at present is taken as ₹408 and a dividend of ₹10 is expected to be paid in the two months time, then, calculate value of the call option.

Solution:

1. Computation of Value of Option if Current Price is ₹415

(a) Basic Data

Factor	Notation	Value
Current Stock Price	SP_0	₹415
Exercise Price	EP	₹400
Time	t	0.25
Risk Free Rate of Return	r	5% or 0.05
Standard Deviation of Return	σ	0.22
Variance	σ^2	0.0484

$$D_1 = \frac{\ln(SP_0/EP) + [(r - 0.50\sigma^2)xt]}{\sigma\sqrt{t}}$$

$$= [\ln(415/400) + (0.05 + 0.50 \times 0.0484) \times 0.25] / [0.22 \times \sqrt{0.25}]$$

$$= [\ln 1.0375 + (0.05 + 0.0242) \times 0.25] / [0.22 \times 0.5]$$

$$= [\ln 1.0375 + 0.01855] / [0.11]$$

$$= (0.03922 + 0.01855)/0.11 = 0.05777/0.11 = 0.5252$$

$$D_2 = \frac{\ln(SP_0/EP) + [(r - 0.50\sigma^2)xt]}{\sigma\sqrt{t}} = D_1 - \sigma\sqrt{t}$$

$$= 0.5252 - 0.22 \times \sqrt{0.25} = 0.5252 - 0.11 = 0.4152$$

(b) Computation of Probability Factors

$$N(D_1) = N(0.5252) = 0.50 + 0.2019 = 0.7019$$

$$N(D_2) = N(0.4152) = 0.50 + 0.1628 = 0.6628$$

(c) Computation of Value of Call

$$\text{Value of Call} = SP_0 \times N(D_1) - [EP \times e^{-rt} \times N(D_2)]$$

$$= [₹415 \times 0.7019] - [₹400 \times e^{-0.05 \times 0.25} \times 0.6628]$$

$$= ₹291.2885 - ₹400 \div 1.01308 \times 0.6628$$

$$= ₹291.2885 - ₹261.697 = ₹29.5915$$

(d) Inference

Since the price of the call is ₹25 which is less than the Value of Call under Black and Scholes Model, it is under priced. Hence, **Buy**.

2. Computation of Value of Call if the Current Market Price is ₹385

(a) Basic Data

Factor	Notation	Value
Current Stock Price	SP_0	₹385
Exercise Price	EP	₹400
Time	t	0.25
Risk Free Rate of Return	r	5% or 0.05
Standard Deviation of Return	σ	0.22
Variance	σ^2	0.0484

$$D_1 = \frac{\ln(SP_0/EP) + [(r - 0.50\sigma^2)xt]}{\sigma\sqrt{t}}$$

$$= [\ln(385/400) + (0.05 + 0.50 \times 0.0484) \times 0.25] / [0.22 \times \sqrt{0.25}]$$

$$= [\ln 0.96 + (0.05 + 0.0242) \times 0.25] / [0.22 \times 0.5]$$

$$= [\ln(0.96) + 0.01855]/[0.11]$$



$$= (-0.00408 + 0.01855)/0.11$$

$$= (-0.02225)/0.11 = -0.2023$$

$$D_2 = \frac{\ln(SP_0/EP) + [(r - 0.506^2) \times t]}{\sigma\sqrt{t}} = D_1 - \sigma\sqrt{t}$$

$$= 0.2023 - 0.22 \times \sqrt{0.25}$$

$$= -0.2023 - 0.11 = -0.3123$$

(b) Computation of Probability Factors

$$N(D_1) = N(-0.2023) = 0.50 - 0.1141 = 0.3859$$

$$N(D_2) = N(-0.3123) = 0.50 - 0.1591 = 0.3409$$

(c) Computation of Value of Call

$$\text{Value of Call} = SP_0 \times N(D_1) - [EP \times e^{-rt} \times N(D_2)]$$

$$= [₹385 \times 0.3859] - [₹400 \times e^{-0.05 \times 0.25} \times 0.3409]$$

$$= ₹148.572 - ₹400 \div 1.01308 \times 0.3409$$

$$= ₹148.572 - ₹134.60$$

$$= ₹13.972$$

3. Value of Put if the Current Market Price is ₹380

$$\text{Value of call option} = ₹13.972$$

$$\text{Current Market value} = ₹385$$

$$\text{Present Value of Exercise Price} = 400 \times e^{-0.05 \times 0.25}$$

$$= 400 + e^{0.05 \times 0.25}$$

$$= 400 \div 1.01308$$

$$= ₹394.84$$

Using the Put Call Parity Theory,

$$\text{Value of Put} = \text{Value of Call} + \text{Present Value of Exercise Price} - \text{Spot Price}$$

$$V_p = 13.972 + 394.84 - 385$$

$$= ₹23.812$$

4. Value of Call Option if share price is ₹408 and dividend of ₹10 is expected in 2 months.

(a) Computation of Adjusted Stock Price

Since dividend is expected to be paid in two months time, the share price has to be adjusted for Dividend and thereafter the Black Scholes model is applied to value the option:

$$\text{Present value of Dividend} = \text{Dividend} \times e^{-rt}$$

$$= ₹10 \times e^{-0.05 \times 0.1666}$$

$$= ₹10 \div e^{0.008333}$$

$$= ₹10 \div 1.00803$$

$$= ₹9.92$$

Adjusted Spot Price = Spot Price - Present Value of Dividend

= 408 - 9.92

= ₹ 398.08

(b) Basic Data

Factor	Notation	Value
Adjusted Current Stock Price	SP_0	₹398.08
Exercise Price	EP	₹400
Time	t	0.25
Risk Free Rate of Return	r	5% or 0.05
Standard Deviation of Return	σ	0.22
Variance	σ^2	0.0484

$$D_1 = \frac{\ln(SP_0/EP) + [(r - 0.5\sigma^2) \times t]}{\sigma\sqrt{t}}$$

$$= [\ln(398.08/400) + 0.05 + 0.50 \times 0.0484] \times 0.25 / [0.22 \times \sqrt{0.25}]$$

$$= [\ln 0.9952 + (0.05 + 0.0242) \times 0.25] / [0.22 \times 0.5]$$

$$= [\ln 0.9952 + 0.01855] / [0.11]$$

$$= (-0.01005 + 0.01855) / 0.11$$

$$= (-0.0085) / 0.11 = \mathbf{0.0773}$$

$$D_2 = \frac{\ln(SP_0/EP) + [(r - 0.5\sigma^2) \times t]}{\sigma\sqrt{t}} = D_1 - \sigma\sqrt{t}$$

$$= 0.0773 - 0.22 \times \sqrt{0.25}$$

$$= -0.0773 - 0.11$$

$$= \mathbf{-0.0327}$$

(c) Computation of Probability Factors

$$N(D_1) = N(0.0773) = 0.50 + 0.0319 = 0.5319$$

$$N(D_2) = N(-0.0327) = 0.50 - 0.0120 = 0.488$$

(d) Computation of Value of Call Value of Call = $SP_0 \times N(D_1) - [EP \times e^{-rt} \times N(D_2)]$

$$= [₹398.08 \times 0.5319] - [₹400 \times e^{-0.05 \times 0.25} \times 0.488]$$

$$= ₹211.7388 - ₹400 \div 1.01308 \times 0.488$$

$$= ₹211.7388 - ₹192.6797$$

$$= ₹19.06$$



Illustration 53.

The market received rumor about XYZ Corporation's tie-up with a multinational company. This has induced the market price to move up. If the rumor is false, the XYZ Corporation's stock price will probably fall dramatically. To protect from this an investor has bought the call and put options.

He purchased one 3 months call with a strike price of ₹42 for ₹2 premium, and paid Re.1 per share premium for a 3 months put with a strike price of ₹40.

- Determine the Investor's position if the tie up offer bids the price of XYZ Corporation's stock up to ₹44 in 3 months.
- Determine the Investor's ending position, if the tie up programme fails and the price of the stocks falls to ₹35 in 3 months.

Solution:

1. Cost of call and put options

Cost of Call and Put Options = (₹2 per share Call) + (Re.1 per share Put)

$$= ₹2 + \text{Re.1} = ₹3$$

2. Position if Price increases to ₹43.

Particulars	Time	₹
(a) Cost of Options	T_0	3
(b) If Price increases to ₹44, Investor will not exercise the Put Option. Gain on Call [Spot Price on Expiry Date - Exercise Price = ₹44 - ₹42]	T_1	2
(c) Net Loss due to Options [(a) - (b)]	T_1	1

3. Position if Price falls to ₹36

Particulars	Time	₹
(a) Cost of Options	T_0	3
(b) If Price falls to ₹35, Investor will not exercise the Call Option. Gain on Put [Exercise Price - Spot price on Expiry Date = ₹40 - ₹35]	T_1	5
(c) Net Gain due to Options [(b) - (a)]	T_1	2

7.3 SWAPS & SWAPTION

Swaps

A swap is an agreement between two parties to exchange sequences of cash flows for a set period of time. Usually, at the time the contract is initiated, at least one of these series of cash flows is determined by a random or uncertain variable, such as an interest rate, foreign exchange rate, equity price or commodity price. Conceptually, one may view a swap as either a portfolio of forward contracts, or as a long position in one bond coupled with a short position in another bond.

Unlike most standardized options and futures contracts, swaps are not exchange-traded instruments. Instead, swaps are customized contracts that are traded in the over-the-counter (OTC) market between private parties. Firms and financial institutions dominate the swaps market, with few (if any) individuals ever participating. Because swaps occur on the OTC market, there is always the risk of a counterparty defaulting on the swap.

Swap is a combination of forwards by two counterparties. It is arranged to reap the benefits arising from the fluctuations in the market -either currency market or interest rate market or any other market for that matter.

Features of Swap :

The following are the important features of a swap:

- (i) Basically a forward: A swap is nothing but a combination of forwards. So, it has all the properties of forward contract.
- (ii) Double coincidence of wants-. Swap requires that two parties with equal and opposite needs must come into contact with each other, i.e., rate of interest differs from market to market and within the market itself. It varies from borrowers to borrowers due to relative credit worthiness of borrowers.
- (iii) Comparative Credit Advantage-. Borrowers enjoying comparative credit advantage in floating rate debts will enter into a swap agreement to exchange floating rate interest with the borrowers enjoying comparative advantage in fixed interest rate debt, like bonds. In the bond market, lending is done at a fixed rate for a long duration, and therefore the lenders do not have the opportunity to adjust the interest rate according to the situation prevailing in the market.
- (iv) Flexibility: In short term market, the lenders have the flexibility to adjust the floating interest rate (short term rate) according to the conditions prevailing in the market as well as the current financial position of the borrower. Hence, the short term floating interest rate is cheaper to the borrower with low credit rating when compared with fixed rate of interest.
- (v) Necessity of an Intermediary-. Swap requires the existence of two counterparties with opposite but matching needs. This has created a necessity for an intermediary to cancel both the parties. By arranging swaps, these intermediaries can earn income too. Financial companies, particularly banks, can play a key role in this innovative field by virtue of their special position in the financial market and their knowledge of the diverse needs of the customers.
- (vi) Settlements: Through a specified principal amount is mentioned in the swap agreement; there is no exchange of principal. On the other hand, a stream of fixed rate interest is exchanged for a floating rate of interest, and thus, there are streams of cash flows rather than single payment.
- (vii) Long term agreement. Generally, forwards are arranged for short period only. Long dated forward rate contracts are not preferred because they involve more risks like risk of default, risk of interest rate fluctuations etc. But, swaps are in the nature of long term agreement and they are just like long dated forward rate contracts. The exchange of a fixed rate for a floating rate requires a comparatively longer period.



Types of swaps

The five common types of swaps include:

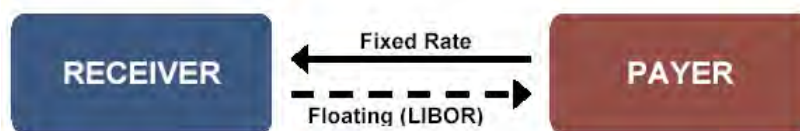
1. Interest rate swaps

Interest-rate swaps have become an integral part of the fixed-income market. These derivative contracts, which typically exchange – or swap – fixed-rate interest payments for floating-rate interest payments, are an essential tool for investors who use them to hedge, speculate, and manage risk.

This article aims to explain why swaps have become so important to the bond market. It begins with a basic definition of interest-rate swaps, outlines their characteristics and compares them with more familiar instruments, such as loans. Later, we examine the swap curve, some of the uses of swaps, and the risks associated with them.

An interest rate swap is an agreement between two parties to exchange one stream of interest payments for another, over a set period of time. Swaps are derivative contracts and trade over-the-counter.

The most commonly traded and most liquid interest rate swaps are known as “vanilla” swaps, which exchange fixed-rate payments for floating-rate payments based on LIBOR, the interest rate high-credit quality banks (AA-rated or above) charge one another for short-term financing. LIBOR, “The London Inter-Bank Offered Rate,” is the benchmark for floating short-term interest rates and is set daily.) Although there are other types of interest rate swaps, such as those that trade one floating rate for another, plain vanilla swaps comprise the vast majority of the market.



By convention, each participant in a vanilla swap transaction is known by its relation to the fixed rate stream of payments. The party that elects to receive a fixed rate and pay floating is the “receiver,” and the party that receives floating in exchange for fixed is the “payer.” Both the receiver and the payer are known as “counterparties” in the swap transaction.

Investment and commercial banks with strong credit ratings are swap market-makers, offering both fixed and floating-rate cash flows to their clients. The counterparties in a typical swap transaction are a corporation, a bank or an investor on one side (the bank client) and an investment or commercial bank on the other side. After a bank executes a swap, it usually offsets the swap through an interdealer broker and retains a fee for setting up the original swap. If a swap transaction is large, the interdealer broker may arrange to sell it to a number of counterparties, and the risk of the swap becomes more widely dispersed. This is how banks that provide swaps routinely shed the risk, or interest-rate exposure, associated with them.

Initially, interest rate swaps helped corporations manage their floating-rate debt liabilities by allowing them to pay fixed rates, and receive floating-rate payments. In this way, corporations could lock into paying the prevailing fixed rate and receive payments that matched their floating-rate debt. (Some corporations did the opposite – paid floating and received fixed – to match their assets or liabilities.) However, because swaps reflect the market’s expectations for interest rates in the future, swaps also became an attractive tool for other fixed-income market participants, including speculators, investors and banks.

As a result, the swap market has grown immensely in the past 20 years or so; the notional dollar value of outstanding interest rate swaps globally was \$230 trillion at the end of 2006, according to the Bank

for International Settlements. Swap volume is termed “notional” because principal amounts, although included in total swap volume, are never actually exchanged. Only interest payments change hands in a swap, as described below.

Characteristics of Interest Rate Swaps

The “swap rate” is the fixed interest rate that the receiver demands in exchange for the uncertainty of having to pay the short-term LIBOR (floating) rate over time. At any given time, the market's forecast of what LIBOR will be in the future is reflected in the forward LIBOR curve.

At the time of the swap agreement, the total value of the swap's fixed rate flows will be equal to the value of expected floating rate payments implied by the forward LIBOR curve. As forward expectations for LIBOR change, so will the fixed rate that investors demand to enter into new swaps. Swaps are typically quoted in this fixed rate, or alternatively in the “swap spread,” which is the difference between the swap rate and the U.S. Treasury bond yield (or equivalent local government bond yield for non-U.S. swaps) for the same maturity. Swap spreads are discussed in more detail in the next section.

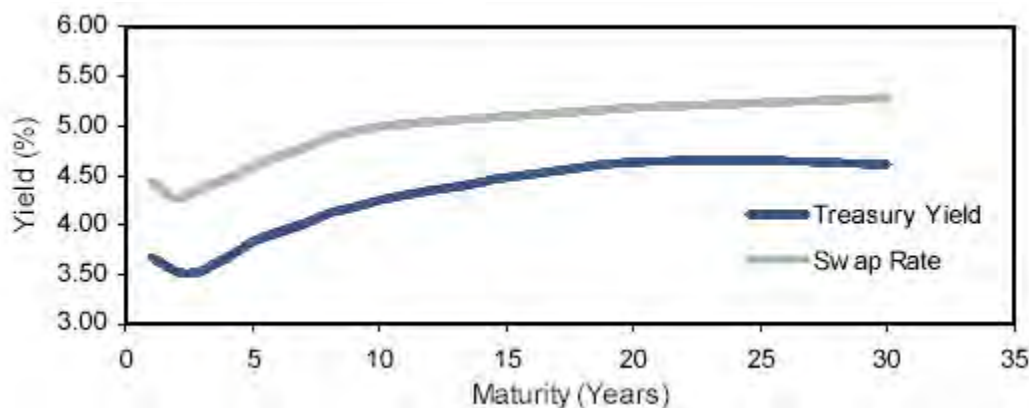
In many ways, interest rate swaps resemble other familiar forms of financial transactions, and it is helpful to think of swaps in these terms:

- **Exchanging Loans.** Early interest rate swaps were literally an exchange of loans, and this model still provides an intuitive way to think about swaps. Consider two parties that have taken out loans of equal value, but one has borrowed at the prevailing fixed rate and the other at a floating rate tied to LIBOR. The two agree to exchange their loans, or swap interest rates. Since the principal is the same, there is no need to exchange it, leaving only the quarterly cash flows to be exchanged. The party that switches to paying a floating rate might demand a premium or cede a discount on the original fixed borrower's rate, depending on how interest rate expectations have changed since the original loans were taken out. The original fixed rate, plus the premium or minus the discount, would be the equivalent of a swap rate.
- **The Financed Treasury Note.** Receiving fixed rate payments in a swap is similar to borrowing cash at LIBOR and using the proceeds to buy a U.S. Treasury note. The buyer of the Treasury will receive fixed payments, or the “coupon” on the note, and be liable for floating LIBOR payments on the loan. The concept of a “financed Treasury” illustrates an important characteristic that swaps share with Treasuries: both have a discrete duration, or interest rate sensitivity, that depends on the maturity of the bond or contract.

The Swap Curve

The plot of swap rates across all available maturities is known as the swap curve, as shown in the chart below. Because swap rates incorporate a snapshot of the forward expectations for LIBOR and also reflect the market's perception of credit quality of these AA-rated banks, the swap curve is an extremely important interest rate benchmark.

The Swap Curve and Treasury Yield Curve



Although the swap curve is typically similar in shape to the Treasury yield curve, outright swap rates are generally higher than Treasury yields with corresponding maturities, as the chart above illustrates. This premium, or “swap spread” at any given maturity, mostly reflects the incremental credit risk associated with the banks that provide swaps compared to Treasuries, which are viewed as risk-free. While the swap spread can also be driven by short-term supply and demand fundamentals and other factors within the swap market, the overall level of swap spreads across maturities can also offer a broad reading of the creditworthiness of the major banks that provide swaps.

Because the swap curve reflects both LIBOR expectations and bank credit, then, it is a powerful indicator of conditions in the fixed income markets. In certain cases, the swap curve has supplanted the Treasury curve as the primary benchmark for pricing and trading corporate bonds, loans and mortgages.

Uses for Swaps

Interest rate swaps became an essential tool for many types of investors, as well as corporate treasurers, risk managers and banks, because they have so many potential uses. These include:

- **Portfolio management.** Interest rate swaps allow portfolio managers to add or subtract duration, adjust interest rate exposure, and offset the risks posed by interest rate volatility. By increasing or decreasing interest rate exposure in various parts of the yield curve using swaps, managers can either ramp-up or neutralize their exposure to changes in the shape of the curve, and can also express views on credit spreads. Swaps can also act as substitutes for other, less liquid fixed income instruments.

Moreover, long-dated interest rate swaps can increase the duration of a portfolio, making them an effective tool in Liability Driven Investing, where managers aim to match the duration of assets with that of long-term liabilities.

- **Speculation.** Because swaps require little capital up front, they give fixed-income traders a way to speculate on movements in interest rates while potentially avoiding the cost of long and short positions in Treasuries. For example, to speculate that five-year rates will fall using cash in the Treasury market, a trader must invest cash or borrowed capital to buy a five-year Treasury note. Instead, the trader could “receive” fixed in a five-year swap transaction, which offers a similar speculative bet on falling rates, but does not require significant capital up front.
- **Corporate finance.** Firms with floating rate liabilities, such as loans linked to LIBOR, can enter into swaps where they pay fixed and receive floating, as noted earlier. Companies might also set up swaps to pay floating and receive fixed as a hedge against falling interest rates, or if floating rates more closely match their assets or income stream.

- **Risk management.** Banks and other financial institutions are involved in a huge number of transactions involving loans, derivatives contracts and other investments. The bulk of fixed and floating interest rate exposures typically cancel each other out, but any remaining interest rate risk can be offset with interest rate swaps.
- **Rate-locks on bond issuance.** When corporations decide to issue fixed-rate bonds, they usually lock in the current interest rate by entering into swap contracts. That gives them time to go out and find investors for the bonds. Once they actually sell the bonds, they exit the swap contracts. If rates have gone up since the decision to sell bonds, the swap contracts will be worth more, offsetting the increased financing cost.

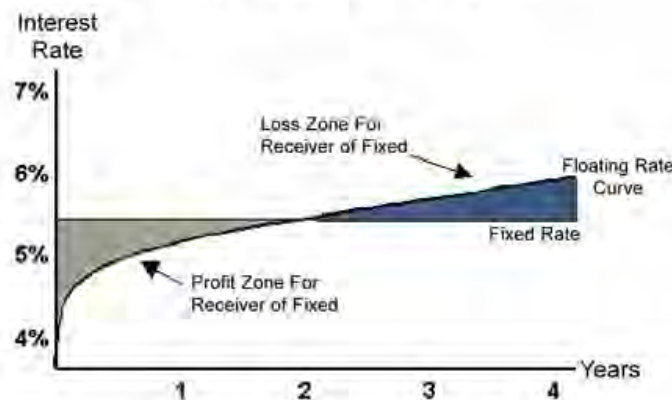
Risks Associated with Interest Rate Swaps

Like most non-government fixed income investments, interest-rate swaps involve two primary risks: interest rate risk and credit risk, which is known in the swaps market as counterparty risk.

Because actual interest rate movements do not always match expectations, swaps entail interest-rate risk. Put simply, a receiver (the counterparty receiving a fixed-rate payment stream) profits if interest rates fall and loses if interest rates rise. Conversely, the payer (the counterparty paying fixed) profits if rates rise and loses if rates fall.

At the time a swap contract is put into place, it is typically considered "at the money," meaning that the total value of fixed interest-rate cash flows over the life of the swap is exactly equal to the expected value of floating interest-rate cash flows. In the example shown in the graph below, an investor has elected to receive fixed in a swap contract. If the forward LIBOR curve, or floating-rate curve, is correct, the 5.5% he receives will initially be better than the current floating 4% LIBOR rate, but after some time, his fixed 5.5% will be lower than the floating rate. At the inception of the swap, the "net present value," or sum of expected profits and losses, should add up to zero.

A Typical Swap Transaction At Inception



(When an investor enters into a swap, the difference between the fixed rate payments and the expected future floating rate payments should be zero (the blue zone equals the gray zone).)

However, the forward LIBOR curve changes constantly. Over time, as interest rates implied by the curve change and as credit spreads fluctuate, the balance between the gray zone and the blue zone will shift. If interest rates fall or stay lower than expected, the "receiver" of fixed will profit (gray area will expand relative to blue). If rates rise and hold higher than expected, the "receiver" will lose (blue expands relative to gray).

If a swap becomes unprofitable or if a counterparty wishes to shed the interest rate risk of the swap, that counterparty can set up a countervailing swap – essentially a mirror image of the original swap – with a different counterparty to "cancel out" the impact of the original swap. For example, a receiver could set up a countervailing swap in which he pays the fixed rate.



Swaps are also subject to the counterparty's credit risk: the chance that the other party in the contract will default on its responsibility. Although this risk is very low – banks that deal in LIBOR and interest rate swaps generally have very high credit ratings of double-A or above – it is still higher than that of a risk-free U.S. Treasury bond.

The interest rate swaps market started decades ago as a way for corporations to manage their debt and has since grown into one of the most useful and liquid derivatives markets in the world. Vanilla swaps, which are most common and involve the exchange of floating-rate LIBOR for a fixed interest rate, are used across the fixed-income markets to manage risks, speculate, manage duration and lock in interest rates.

Because swaps are highly liquid and have built-in forward rate expectations as well as a credit component, the swap rate curve has become an important interest-rate benchmark for credit markets that in some cases has supplanted the U.S. Treasury yield curve.

2. Commodity swaps

Commodities are physical assets such as precious metals, base metals, energy stores (such as natural gas or crude oil) and food (including wheat, pork bellies, cattle, etc.). Commodity swaps were first traded in the mid-1970's, and enable producers and consumers to hedge commodity prices. Swaps involving oil prices are probably the most common; however, swaps involving weather derivatives are increasingly popular. The floating leg of a commodity swap is tied to the price of a commodity or a commodity index, while the fixed leg payments are stipulated in the contract as in an interest rate swap. It is common for a commodity swap to be settled in cash, although physical delivery is becoming increasingly common. The floating leg is typically held by a commodity consumer, who is willing to pay a fixed rate for a commodity to guarantee its price. The fixed leg is typically held by a commodity producer who agrees to pay a floating rate which is set by the market price of the underlying commodity, thereby hedging against falls in the price of the commodity. In most cases, swap rates are fixed either by commodity futures, or by estimating the commodity forward price.

There are two main types of commodity swaps:

- **Fixed-floating commodity swaps** are similar to the interest rate fixed-floating swaps except that both legs are commodity based. These are used by commodity producers and consumers to lock in commodity prices.
- **Commodity for interest swaps** are similar to equity swaps, in which a total return on the commodity is exchanged for some money market rate (plus or minus a spread).
- **Credit swaps**

This is a swap contract wherein the buyer makes numerous installments of payments to the seller thus receiving a payoff if an instrument (specifically a loan or bond) goes into default. Less frequently, the credit event responsible for triggering the payoff can include a company going through bankruptcy, restructuring, or even just experiencing a downgrade in credit rating.

3. Currency swaps

A currency swap is the one in which principal and fixed rate interest payments on a loan in one currency are exchanged for the same in another currency. Akin to interest rate swaps, the currency swaps are also influenced by comparative advantage.

The currency swaps are arrangements whereby currencies are exchanged at a specified exchange rates and specified intervals. The currency swap is a derivative instrument which takes care of both, principal-only-swap and interest rate swap, together. If a company has borrowed in US\$ and wants to convert it into a Rupee loan, it can do a currency swap, wherein it will receive from the bank the principal and interest in US\$, and pay the bank a fixed Rupee interest rate and also freeze its principal payment for the entire tenure of the loan. Effectively, the Dollar loan becomes a Rupee loan in Indian Rupees.

4. Equity swaps

In an equity swap two parties agree to exchange future cash flows linked to the performance of a stock or stock index. One cash flow, or leg, is usually linked to a market interest rate, the other to a stock or stock index performance. For example, party A swaps \$10 million at Libor plus 5 basis points for six months with party B who agrees to pay any percentage increase in \$10 million invested in the S&P500. In six months party A will owe the interest on the \$10 million but this will be offset by the percentage increase in the S&P500 multiplied by \$10 million. If the S&P500 falls then party A will owe the percentage fall multiplied by \$10 million in addition to the interest payment.

Benefits of Swap:

The following advantages can be derived by a systematic use of swap:

1. Borrowing at Lower Cost:

Swap facilitates borrowings at lower cost. It works on the principle of the theory of comparative cost as propounded by Ricardo. One borrower exchanges the comparative advantage possessed by him with the comparative advantage possessed by the other borrower. The net result is that both the parties are able to get funds at cheaper rates.

2. Access to New Financial Markets:

Swap is used to have access to new financial markets for funds by exploring the comparative advantage possessed by the other party in that market. Thus, the comparative advantage possessed by parties is fully exploited through swap. Hence, funds can be obtained from the best possible source at cheaper rates.

3. Hedging of Risk:

Swap can also be used to hedge risk. For instance, a company has issued fixed rate bonds. It strongly feels that the interest rate will decline in future due to some changes in the economic scene. So, to get the benefit in future from the fall in interest rate, it has to exchange the fixed rate obligation with floating rate obligation. That is to say, the company has to enter into swap agreement with a counterparty, whereby, it has to receive fixed rate interest and pay floating rate interest. The net result is that the company will have to pay only floating rate of interest. The fixed rate it has to pay is compensated by the fixed rate it receives from the counterparty. Thus, risks due to fluctuations in interest rate can be overcome through swap agreements. Similar, agreements can be entered into for currencies also.

4. Tool to correct Asset-Liability Mismatch:

Swap can be profitably used to manage asset-liability mismatch. For example, a bank has acquired a fixed rate bearing asset on the one hand and a floating rate of interest bearing liability on the other hand. In case the interest rate goes up, the bank would be much affected because with the increase in interest rate, the bank has to pay more interest. This is so because, the interest payment is based on the floating rate. But, the interest receipt will not go up, since, the receipt is based on the fixed rate. Now, the asset-liability mismatch emerges. This can be conveniently managed by swap. If the bank feels that the interest rate would go up, it has to simply swap the fixed rate with the floating rate of interest. It means that the bank should find a counterparty who is willing to receive a fixed rate interest in exchange for a floating rate. Now, the receipt of fixed rate of interest by the bank is exactly matched with the payment of fixed rate interest to swap counterparty. Similarly, the receipt of floating rate of interest from the swap counterparty is exactly matched with the payment of floating interest rate on liabilities. Thus, swap is used as a tool to correct any asset-liability mismatch in interest rates in future.

5. Additional Income:

By arranging swaps, financial intermediaries can earn additional income in the form of brokerage.



Role of Financial Intermediaries in swap arrangements.

- 1. Swap Arrangements:** Non-financial Companies do not get in touch directly to arrange a swap. They each deal with a financial intermediary such a Bank or other Financial Institution.
- 2. Contracts:** The Financial Institution has two separate contracts, one with either party. Generally, the parties to the Swap arrangement will not know that the Financial Institution has entered into an offsetting swap with the other beneficiary.
- 3. Risk of Default:** If one of the beneficiary Company defaults, the Financial Institution still has to honour its agreement with the other Company.
- 4. Compensation:** Swaps are structured to ensure that the financial institution earns around 5% on a pair of offsetting transactions. The margin of 5 basis points is partly to compensate the Financial Institution for the risk that one of the two beneficiaries will default on the swap payments.

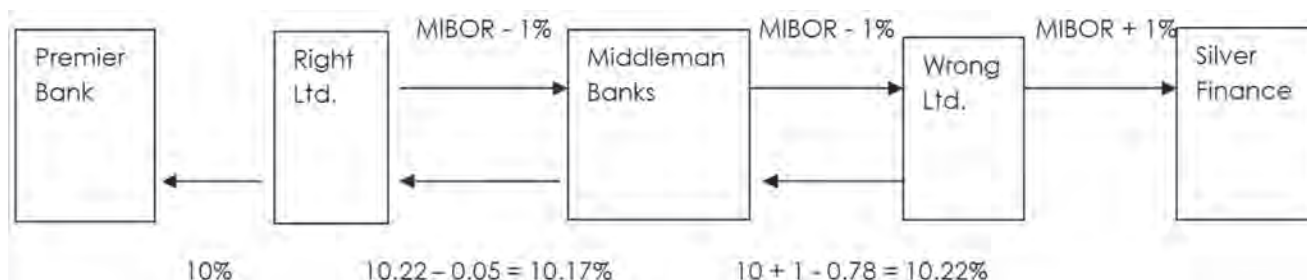
Example: From the following information given below, compute the gain to be shared between Right Ltd and Wrong Ltd in the Interest Swap arrangement

Company	Banker	Fixed Rate	Floating Rate
Right Ltd	Premier Bank	10%	MIBOR – 1%
Wrong Ltd	Sliver Finance	13%	MIBOR + 1%

Middleman Banks is the financial intermediary for a commission of 5 basis points. Net Gain shared in the ratio of 3: 2 between Right Ltd and Wrong Ltd.

Computation of Gain to be shared:

Particulars	Value
Fixed Rate for Wrong Ltd	14.00%
Less: Fixed Rate for Right Ltd	10.00%
Spread in Fixed Rates [A]	4.00%
Floating Rate for Wrong Ltd	MIBOR + 1.00%
Less: Floating Rate for Right Ltd	MIBOR - 1.00%
Spread in Floating Rate [B]	2.00%
Gain [A] - [B]	2.00%
Less: Commission to Middleman Ltd	(0.05%)
Net Gain	1.95%
Share of Right Ltd [0.95% X 3 / 5]	1.17%
Share of Wrong Ltd [0.95% X 2 / 5]	0.78%



Valuing Interest Rate Swap Arrangement under Bond Valuation approach

- 1. Value of Swap:** From the point of view of the floating-rate payer, a swap can be regarded as a long position (Buy Bond) in a fixed rate bond and a short position (Sell Bond) in a floating-rate bond.

$$\Rightarrow V_{\text{SWAP}} = B_{\text{FIX}} - B_{\text{FL}}$$

Where, V_{SWAP} = Value of Swap

B_{FIX} = Value of Fixed Rate Bond (corresponding to payments that are made)

B_{FL} = Value of Floating Rate bond (corresponding to payments that are received)

2. Value of Fixed Rate Bond:

- Value of Fixed Rate Bond is the present value of all the associated cash flows. Continuous compounding method is used to value the bond.
- The appropriate discount rate will be the interest rate under Floating Rate Scheme for that period.

Example: On 01.04.2012, a 3-Month bond carries an interest rate of 10% p.a., 6-Month bond carries interest at 9% p.a., 9-Month bond carries interest at 11% and 12-Month bond carries an interest rate of 11%. Fixed Rate Bond for a period of 1 Year carries an interest rate of 11% p.a. payable on quarterly basis.

Computation of Value of Fixed Rate Bond:

Time(t)	Nature of Cash Flow	Cash Flow	Discount Rate(r)	Discount Factor [e^{-rt}]	Disc. Cash Flow
(1)	(2)	(3)	(4)	(5)	(6) = (5) X (3)
3 Months or 0.25 Years	Interest Receipt	₹6,000	10%	$e^{-0.25 \times 0.10} = e^{-0.025} = 0.9753$	₹5,852
6 Months or 0.50 Years	Interest Receipt	₹6,000	9%	$e^{-0.50 \times 0.09} = e^{-0.045} = 0.9559$	₹5,735
9 Months or 0.75 Years	Interest Receipt	₹6,000	11%	$e^{-0.75 \times 0.11} = e^{-0.083} = 0.9208$	₹5,525
12 Months or 1.00 Years	Interest and Principal	₹1,06,000	11%	$e^{-1.00 \times 0.11} = e^{-0.11} = 0.8958$	₹94,955
Value of Fixed Rate Bond					₹1,12,067

Note: Interest Receipt = ₹2,00,000 x 12% x 3/12 = ₹6,000

3. Value of Floating Rate Bond:

- Value of Floating Rate Bond is equal to the notional principal immediately after an interest payment. Hence, just before the interest payment, bond is worth the notional principal and the interest amount.
- Therefore, value of Floating Rate Bond is the present value of interest payment and notional principal receivable / payable at the next due date.
- The appropriate discount factor would be the floating rate applicable for period till the next payment date.



(d) $\text{Value} = (P + I^{\#})xe^{-r^{\#}t^{\#}}$

Where P = Notional Principal

$I^{\#}$ = Floating payment that will be made at time $t^{\#}$

$t^{\#}$ = Time determined at the last payment date

$r^{\#}$ = Swap Zero Rate (MIBOR / LIBOR Rate) for a maturity of $t^{\#}$

Example: A Floating Rate Bond, face value ₹4 lakh, will pay interest at 10% p.a. on 30.09.2012. Interest is paid on semi-annual basis. The last interest was paid on 31.03.2012. What is the value of the floating rate bond as on 30.06.2012, if as on that date a 3-month floating rate bond carries an annual interest rate of 11%?

Step	Activity
1	Computation of Annual Receivable / Payable as on the next due date i.e. 30.09.2011 = Notional Principal ₹4,00,000 + Interest ₹20,000 = ₹4,20,000. Interest = Principal ₹4,00,000 X Interest Rate 10% p. a. X Period of Interest 6 Months
2	Ascertainment of Appropriate Discount Factor The valuation is done as on 30.06.2012. As on that date, a 3-month Floating Rate Bond (i.e. period from the valuation date till the next interest payment date) carries an interest rate of 11%. Therefore, appropriate discount rate is 11%.
3	Computation of Present Value = Amount Receivable / Payable X e^{-rt} = ₹4,20,000 x $e^{-0.11 \times 0.25}$ = ₹4,20,000 x $e^{-0.028}$ = ₹4,20,000 x 0.972 = ₹4,08,240

Value an Interest Rate Swap arrangement under Forward Rate Agreement approach

1. Approach:

- Interest payable / receivable under Fixed Rate Scheme and Floating Rate Scheme at different points in time will be ascertained.
- Net amount payable or receivable will be computed i.e. Interest Receivable **Less** Interest Payable as on each of the future dates.
- The Net Amount will be discounted to present value based on appropriate discount rate.

2. Appropriate Discount Rate: The appropriate discount rate will be the interest rate under Floating Rate Scheme for that period i.e. for an interest receivable in 3 months, the floating rate for a 3-Month bond will be considered, for interest receivable in 6 months, floating rate for a 6-Month bond will be considered.

3. Cash Flow under Floating Interest Rate:

- Forward Interest Rate will be computed based on Floating Interest Rates for different periods. Based on such Forward Interest Rates, interest payments will be computed.
- Notional principal amount will not be considered in this approach. Only the interest payments will be considered. [Note: Under the Bond Valuation Approach, the notional principal is also considered]

Example: On 01.04.2012, a 3-Month bond carries an interest rate of 10% p.a., 6-Month bond carries interest at 9% p.a., 9-Month bond carries interest at 11% and 12-Month bond carries an interest rate of

11%. Fixed Rate Bond for a period of 1 Year carries an interest rate of 12% p.a. payable on quarterly basis.

The notional principal amount is ₹ 2,50,000.

In this case, interest rate for the second, third and fourth quarter will be computed using the following formula —

$$\text{Rate of Interest for period } T_2 - T_1 (T_N) = \frac{R_2 T_2 - R_1 T_1}{T_2 - T_1}$$

Where, R_2 = Rate of Interest for Period Ending at T_2 , from today (including T_1 .)

R_1 , = Rate of Interest for Period Ending at T_1

Quarter Ending	Computation	Interest Rate
30.09.2012	$\frac{R_2 T_2 - R_1 T_1}{T_2 - T_1} = \frac{0.09 \times 0.50 - 0.10 \times 0.25}{0.50 - 0.25}$ $= (0.045 - 0.025) \div 0.25 = 0.02 \div 0.25 = 0.08 \text{ or } 8\%$	8%
31.12.2012	$\frac{R_2 T_2 - R_1 T_1}{T_2 - T_1} = \frac{0.11 \times 0.75 - 0.09 \times 0.50}{0.75 - 0.50}$ $= (0.0825 - 0.045) \div 0.25 = 0.0375 \div 0.25 = 0.15 \text{ or } 15\%$	15%
31.03.2013	$\frac{R_2 T_2 - R_1 T_1}{T_2 - T_1} = \frac{0.11 \times 1.00 - 0.11 \times 0.75}{1.00 - 0.75}$ $= (0.11 - 0.0825) \div 0.25 = 0.0275 \div 0.25 = 0.11 \text{ or } 11\%$	11%

Valuation of Swap will be done as follows -Computation of Floating Interest

Time	Discount factor (e^r)	Interest [$P \times e^r - P$]
30.06.2012 (0.25)	$e^{0.25 \times 0.10} = e^{0.025} = 1.0253$	$(2,50,000 \times 1.0253 - 2,50,000) = 6,325$
30.09.2012 (0.50)	$e^{0.25 \times 0.08} = e^{0.02} = 1.0202$	$(2,50,000 \times 1.0202 - 2,50,000) = 5,050$
31.12.2012 (0.75)	$e^{0.25 \times 0.15} = e^{0.0375} = 1.0382$	$(2,50,000 \times 1.0382 - 2,50,000) = 9,550$
31.03.2013 (1.00)	$e^{0.25 \times 0.11} = e^{0.0275} = 1.0279$	$(2,50,000 \times 1.0279 - 2,50,000) = 6,975$



Time (t)	Fixed Cash Flow (Inflow)	Floating Rate	Floating Cash Flow(Outflow)	Net Cash Flow	Discount Rate (r)	Disc. Fac. (e^{-rt})	DCF
30.06.2012 (0.25)	7,500	10%	6,325	1,175	10%	$e^{-0.25 \times 0.10} = e^{-0.025} = 0.9753$	1,146
30.09.2012 (0.50)	7,500	8%	5,050	2,450	9%	$e^{-0.50 \times 0.09} = e^{-0.045} = 0.9560$	2,342
31.12.2012 (0.75)	7,500	15%	9,550	(2,050)	11%	$e^{-0.75 \times 0.11} = e^{-0.083} = 0.9208$	(1,888)
31.03.2013(1.00)	7,500	11%	6,975	525	11%	$e^{-1.00 \times 0.11} = e^{-0.11} = 0.8958$	470
Value of Interest Rate Swap							2,070

Note: For computing the interest under floating rate scheme, the interest rate applicable for that quarter is considered. However, for discounting, the interest rate upto the end of that quarter (cumulative interest rate) is considered.

Valuation of Currency Swap

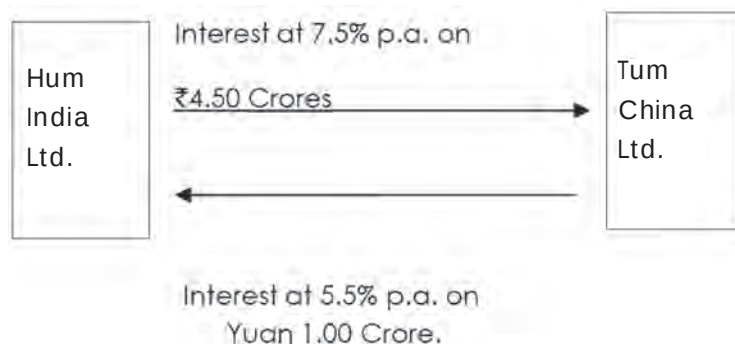
Currency Swaps refer to the arrangement where principal and interest payments in one currency are exchanged for such payments in another currency.

Types: Currency Swaps can be categorized based on how interest rates are structured —

- Fixed for Fixed Currency Swap:** The interest payments exchanged are payable under Fixed Rate Basis for both the contracting parties.
- Fixed for Floating Currency Swap:** Interest payments exchanged are payable under Fixed Rate Basis for one party and Floating Rate basis for the other party.
- Floating for Floating Currency Swap:** Interest payments exchanged are payable under Floating Rate Basis for both the parties. However, the base for fixing the floating rates is the same for both the parties, i.e. LIBOR or MIBOR etc.

Example: Hum India Ltd wants a loan equalling Yuan 1 Crore and Tum China Ltd wants a loan of ₹ 4.50 Crores. The interest payable is 5.5% on Chinese Yuan Loans and 7.5% in Indian Rupees. The exchange rate prevailing on this day is 1 Yuan = ₹5.50. In this case, Hum India Ltd and Tum China Ltd can enter into a Swap Agreement to exchange interest cash flows as follows —

- Hum India Ltd will pay interest at 7.5% on a sum of ₹ 4.50 Crores to Tum China Ltd
- Tum China Ltd will pay interest at 5.5% on a sum of Yuan 1.00 Crore to Hum India Ltd



Note: The above example is a case of Fixed for Fixed Currency Swap.

Valuation of Commodity Swaps

Swap is considered as a strip of forwards, each priced at inception with zero market value in PV terms. While valuing commodity swaps, the following factors must be considered:

- Institutional structure of the particular commodity market.
- Credit risk, capital costs and administrative costs.
- Variability of the futures bid or offer spread.
- Brokerage Fees
- liquidity of the underlying commodity market.
- Cost of hedging.
- Seasonal Fluctuations and its impact on the market

Generic Swap with the formulas for Fixed Interest and Floating interest rates

- Fixed interest payments** are calculated, assuming each month has 30 days and the quoted interest rate is based on a 360-day year.

The semiannual fixed-rate payment would be: $= P \times (N \div 360) \times R$

Where "P" - notional principal amount; "N" - Time in days; "R" - All in Cost rate

- Floating-rate payments** are based on an actual/360-day count, meaning that interest payments are calculated using actual number of days elapsed since the previous payment date, based on a 360-day year.

Floating Rate Payment = $P \times (N_t \div 360) \times \text{LIBOR}$

Where "P" - notional principal amount; N_t - Time elapsed since previous payment;

Conventions relating to Day-Count used in computation of Swaps

Nature of Payment	No. of days for computation
Fixed payments	Either actual/365 (bond equivalent) basis or on an actual/360 basis
Floating-rate payments indexed to private-sector interest rates	actual/360 day-count convention
Floating-rate payments tied to Treasury bill rates	actual/365 basis

Swaption

A **swaption** is an option on a forward start swap which provides the purchaser the right to either pay or receive a fixed rate. A buyer of a swaption who has the right to pay fixed and receive floating is said to have purchased a 'payers swaption'. Alternatively, the right to exercise into a swap whereby the buyer receives fixed and pays floating is known as a 'receivers swaption'.

Since the underlying swap can be thought of as two streams of cash flows, the right to receive fixed is the same as the right to pay floating. In this sense, swaptions are analogous to foreign exchange options where a call in one currency is identical to a put on the other currency. However, the option terminology of calls and puts is somewhat confusing for swaptions as it is not used consistently in the market. Some participants describe the right to pay fixed as a call since it provides the right to buy the swap (i.e. pay fixed). Others look at a swaption's relationship to the bond market and say that if



you pay fixed you are short the bond and therefore look at this swaption as a put. To eliminate any confusion, market participants generally describe swaptions as 'payers' versus 'receivers' with respect to the fixed rate.

Swaptions can be used as hedging vehicles for fixed debt, floating debt or swaps. The primary purposes for entering into a swaption are:

- to hedge call or put positions in bond issues
- to change the tenor of an underlying swap
- to assist in the engineering of structured notes
- to change the payoff profile of the firm

Original interest arose from the issuance of bonds with embedded put features. Often, the price of the bond did not fully reflect the fair value of the embedded option and the issuer would sell a swaption to obtain a lower fixed cost of funds. This application of swaptions continues today for both bonds with call or put features.

A significant percentage of these debt issues are swapped out to obtain cheaper LIBOR funding. In these cases the issuer needs a facility to cancel the swap if the bonds are put or called. To eliminate this exposure, the companies would enter into a swaption to offset the underlying swap. This can be done two ways using either a cancelable or extendible swap.

A cancelable swap provides the right to cancel the swap at a given point in the future. An example would be a swap with a tenor of 5 years that can be cancelled after year three. This can be broken into two components. The first is a vanilla five year swap paying floating and receiving fixed. The second component is a payers swaption exercisable into a two year swap three years from today. The result is that when the original bond is called, the swaption is exercised and the cash flows for the original swap and that from the swaption offset one another. If the bond isn't called, the swaption is left to expire.

Another way to obtain a similar result is to use an extendible swap. The components are a three year pay floating / receive fixed swap and a receivers swaption whereby the holder can exercise into a two year swap, three years from today. In this case, exercising the swaption extends the swap to from three years to five years. This would be done if the bond was not called. If the bond was called, the swaption would not be exercised. Extendible and cancelable swaps are used in conjunction with related debt issues or when the user is indifferent to swaps of different tenors. In the latter case, swaptions are sold to obtain the premium which is then used to offset other financing charges.

Swaptions are also used in the engineering of structured notes in order to obtain the contingent payoff profiles requested by the investors. These can be identified in some cases where the cash flows change from fixed to floating or vice versa at some level of interest rates. By reverse engineering a structured note into all of its components, one can calculate its market price or amend the structure's payoff profile.

Finally, financial institutions or corporations may look at their balance sheet and identify contingent interest rate risk that they have or would like to have. By using swaptions, the asset / liability mix can often be altered to obtain the desired risk profile.

Types of Swaptions: Swaptions fall into 3 main categories, depending upon the exercise rights of the buyer:

(a) European Swaption	Gives the buyer right to exercise only on the maturity date of the option.
(b) American Swaption	Gives the buyer right to exercise at any time during the option period.
(c) Bermudan Swaption	Gives the buyer right to exercise on specific dates during the option period.

Example: XYZ & Co. Ltd has dues of \$4 Million in another 8 years on a non-amortizing loan with ICI Bank, with instalments of 3 months @ LIBOR + 200 bps. LIBOR is currently at 7.50%. There exist wide fluctuations

in the interest rates in the market. However there is an expectation of lower LIBOR in the next 3 years. After 3 years, the outlook is again uncertain. The Company is desirous of hedging its risks but is unsure whether the current rates are the optimum. The customer wants to lock in the swap rate in 3 years' time for the following 5 years and have the flexibility to benefit from a lower swap rate if swap rates fall. This is achieved by buying a 3 year option on a 5 year pay fixed at 9% swap. Explain the decision that the customer will have to face in 3 years.

Time	Course of Action
Now	(a) Customer buys a swaption (b) Customer pays floating rate
Exercise Date	(a) If 3-year swap rate is above 9%, swaption is exercised - Customer pays fixed (9%) and receives floating. (b) If 3 year swap rate is below or equal to 9% swaption does not get exercised. (c) Customer pays floating on loan or enters into a 5 year new fixed rate.

Features of Swaptions

- Constituents of Swaptions:** Fixed rate of interest, floating reference interest rate, tenor of the Interest Rate Swap, Option Period and the premium.
Example: 6 month into 3-year swaption implies - option to enter into 3-year Interest Rate Swap, 6 months from now.
- Premium:**
 - Determined based on whether the swaption is a fixed "payer" or a "receiver" type.
 - A fixed-rate payer swaption gives the buyer of option an opportunity to lock into a fixed rate through an Interest Rate Swap on an agreed future date. Hence such a swaption is as a call option on a forward swap rate.
 - The Swaption premium is expressed as basis points. These basis points are applied to the nominal principal of the Forward Interest Rate Swap.
 - The premium is amortized over life of the option by the borrower if the swaption is entered into for reasons of hedging an underlying borrowing.
- Option Period:** "Option Period" refers to time gap between the transaction date and the expiry date.
- Strike Rate:** The fixed rate of interest on the swaption is called the strike rate.
- Settlement:**
 - Swaptions can be cash-settled - On expiry, they are marked to market & difference is settled in cash.
 - Marking to market of a swaption depends on (i) Strike Rate of the swap and (ii) Relationship of the strike price to the underlying, where the underlying is the forward Interest Rate Swap.

Benefits of Swaptions

- A Swaption is designed to give the holder the benefit of the agreed upon strike rate if the market rates are higher, with flexibility to enter into the current market swap rate if they are lower.
- If strike rate of the swap is more favorable than prevailing market swap rate, then the swaption will be exercised and counterparties enter into an interest rate swap as per the swaption agreement.
- A Swaption not only hedges the buyer against downside risk, it also enables the buyer to reap the upside benefits. If the swaption is not exercised by maturity, it lapses on that date.



4. It is therefore a valuable tool when a borrower has decided to do a swap but is not sure of the timing.
5. The leasing company is able to protect itself where the lessee exercises its option to extend the lease.
6. Useful to borrowers targeting an acceptable borrowing rate. By paying an upfront premium, a holder of a payer's swaption can guarantee to pay a maximum fixed rate on a swap, thereby hedging his floating-rate borrowings.
7. Useful to businesses tendering for contracts. Businesses have to decide whether to commit to borrowings in the future in their own currency in terms of a tender on a future project. This also enables them to determine the appropriate rates to be quoted in the offer.
8. Swaptions also provide protection on callable or puttable bond issues.

7.4 INTEREST RATE DERIVATIVES

A financial instrument based on an underlying financial security whose value is affected by changes in interest rates. Interest-rate derivatives are hedges used by institutional investors such as banks to combat the changes in market interest rates. Individual investors are more likely to use interest-rate derivatives as a speculative tool - they hope to profit from their guesses about which direction market interest rates will move.

Interest Rate Caps

An Interest Rate Cap is a contract that guarantees a maximum level of Libor. A Cap can be a guarantee for one particular date, known as a Caplet. A series of Caplets or Cap can extend for up to 10 years in most markets. Caps are also known as Ceilings. In return for making this guarantee, the buyer pays a PREMIUM. Caps generally guarantee a maximum level of either 3 or 6 month Libor or whatever the prevailing floating rate index is in the particular market. The clients' maximum loss on a Cap transaction is the premium.

A Cap is a series of sequentially maturing European style call options that protect the purchaser from a rise in a floating rate index, usually LIBOR, above a predetermined level. The purchaser has the right to receive a periodical cash flow equal to the difference between the market rate and the strike, effectively placing a maximum limit on interest payments on floating rate debt. In the Yen market caps usually have maturities of 1 to 10 years and are based on LIBOR. The standard reset frequency is 3m for 1 year and 6m for 2 years out to 10 years, other reset frequencies are possible, e.g. 1 year against 1m, but uncommon. The standard amount is ¥10 billion.

As usual with OTC options all parameters of the cap are negotiable but the bid-offer spread will widen as the cap becomes more complicated and therefore the transaction cost may increase substantially. Many participants in the market will absorb any mismatch risk between their position and a more standardised cap structure to take advantage of the cheaper cost and greater liquidity.

Features of Interest Rate Caps

- (a) The buyer of an Interest Rate Cap pays premium to the seller for the right to receive the difference in interest cost (on notional principal) when a specified index of market interest rates rises above a stipulated "cap rate".
- (b) The buyer has no obligation or liability if interest rates fall below the specified cap rate.
- (c) Thus, a cap resembles an option which represents **a right rather than an obligation to the buyer**.
- (d) Interest rate caps cover periods ranging from 1-10 years with interest rate reset and payments dates most commonly set either 3 or 6 months apart.

Constituents:

- (a) Notional Principal amount

- (b) Interest Rate Index - specified maturity of LIBOR
- (c) A Cap rate which is equivalent to strike or, exercise price on an option and
- (d) Period of agreement, including payment dates and interest rate reset dates.

Valuation of Interest Rate Cap: Amount of payment on settlement: $[(N) \times \text{Max}(0, r - r_c) \times (d_t/360)]$ N - Notional principal amount; r - LIBOR; r_c - cap rate; d_t - time gap between interest rate reset date and payment date (in days)

Settlement: If the specified market index is above the cap rate, the seller pays the buyer the difference in interest cost on the next payment date.

Interest Rate Collars- Features of Interest Rate Collars

An investment strategy that uses derivatives to hedge an investor's exposure to interest rate fluctuations. The investor purchases an interest rate ceiling for a premium, which is offset by selling an interest rate floor. This strategy protects the investor by capping the maximum interest rate paid at the collar's ceiling, but sacrifices the profitability of interest rate drops.

The buyer of an interest rate collar purchases an interest rate cap while selling a floor indexed to the same interest rate.

Determination of Floors: Borrowers with variable-rate loans buy collars to limit effective borrowing rates to a range of interest rates between maximum determined by the cap rate and a minimum fixed by the floor strike price;

Valuation in Floors: The amount of the payment due to or owed by a buyer of an interest rate collar is $(N) [\text{Max}(0, r - r_c) - \text{Max}(0, r_f - r)] (dt/360)$

Where,

N is the notional principal amount of the agreement R_c is the cap rate

R_f is the floor rate and D_t is the term of the index in days

Benefits: Interest rate collar is less expensive than buying a cap alone because the borrower earns premium income from the sale of the floor that offsets the cost of the cap. A zero-cost collar results when the premium earned by selling a floor exactly offsets the cap premium.

Forward Rate Agreements as an interest rate derivative

Features: Forward Rate Agreements (FRAs) are

- (a) Forward Contracts on interest rates
- (b) Settled in cash and are traded among the international banks in the Eurodollar market.
- (c) A Forward Rate Agreement is an OTC equivalent of a Eurodollar futures contract.
- (d) Normally entered into for the period corresponding to maturity period of Eurodollar time deposits.
- (e) Buying an FRA is similar to selling or going short on a Eurodollar or LIBOR Futures contract.

Purpose: Banks use FRAs to crystallize the amount of interest payable on anticipated future deposits or interest revenues receivable on variable-rate loans (indexed to LIBOR).

Determination of Settlement amount: Final settlement amounts owed by the parties to an FRA are determined by the formula:

Payment = $(N) (\text{LIBOR} - \text{FR}) (1/360) / [1 + \text{LIBOR} (dtm/360)]$

Where,

N = Notional Principal amount of the agreement

LIBOR = value of LIBOR for the maturity specified by contract prevailing on contract settlement date

FR = Agreed-upon forward rate and



t = Maturity of the forward rate specified in days.

Settlement:

Situation	Course of action
Forward Rate > LIBOR	Buyer has to pay the decrease in interest cost i.e. FR - LIBOR
Forward Rate < LIBOR	Seller has to pay the increased interest cost i.e. LIBOR - FR

Note: The principal amount is “notional” since though it determines the amount of differential payment to be settled between the parties, actual exchange of principal never takes place.

Illustrate the structure of Forward Rate Agreements and the settlement process

Situation: Let 2 banks A and B enter into an Forward Rate Agreement containing the following clauses:

- (a) A forward rate of 10% on a Eurodollar deposit with 6 months maturity.
- (b) A \$5 Million notional principal and
- (c) Settlement in 2 months

Explanation:

- (a) The above agreement is termed as 2X3 FRA - Since it fixes the interest rate for a deposit to be placed after 2 months and maturing 8 months after the date the contract is negotiated.
- (b) Settlement:
 - If the 6 month LIBOR is 12% on the settlement date, the seller would owe the buyer - 2% (difference between 12% and 10%) interest on \$5 million for 6 months amounting to \$50,000.
 - But the interest on a Eurodollar deposit is paid on maturity (at the end of the term of deposit) whereas FRAs are settled on the contract maturity date (which would correspond to the date the underlying hypothetical deposit would be placed). Therefore, to make the cash payment on the FRA equivalent to the extra interest that would have been earned on a Eurodollar deposit paying 12%, the difference of \$50,000 in interest costs calculated above is discounted back 6 months using the actual 6 month LIBOR of 6%.
 - Hence, on contract maturity date the buyer would receive $\$50000 / [1 + 0.06(180/360)] = \$48,543.69$

Interest Rate Futures- underlying for interest rate futures in India

Interest rate futures is standardised interest rate derivative contract traded on a stock exchange to buy or sell an interest bearing instrument at a specified future date, at a price determined at the time of the contract.

In India interest rate futures are available on NSE on

- Notional T-Bills
- Notional 10 year bonds (coupon bearing and non-coupon bearing)

Advantages of interest rate futures on the 91-day treasury bills

1. They can be used for hedging against volatile interest rates.
2. Interest rate futures on 91-day treasury bill are cash settled, as a result, investors can trade without the worry of being saddled with illiquid contracts, which could have been the case if the contracts were physically settled.
3. No securities transaction tax (STT) is levied.
4. Low margins required as compared to trading in equities and equity derivatives.
5. The new product would be traded in the currency segment of the exchange so there is no requirement of any new formalities of a new account.

Illustration 54.

On 01.04.2010, following are the interest rate quotes available on different Government of India Bonds, based on the tenor of the Bonds —

Period to Maturity	Interest Rate
1Year	9.50%
2 Years	10.25%
3 Years	11.00%
4 Years	10.75%

Calculate the forward rates of interests as at the following dates —

(a) As on 01.04.2011, 1-Year Bond, 2-Year Bond and 3-Year Bond

(b) As on 01.04.2012, 1-Year Bond and 2-Year Bond

(c) As on 01.04.2013, 1-Year Bond

Solution:**1. Computation of Forward Interest Rates as on 01.04.2011**

Tenor of Bond	Computation	Interest Rate
1-Year	$= \frac{R_2 T_2 - R_1 T_1}{T_2 - T_1} = \frac{0.1025 \times 2 - 0.095 \times 1}{2 - 1}$ $= (0.2050 - 0.095) \div 1 = 0.11 \div 1 = 0.11$	11.00%
2-Year	$= \frac{R_2 T_2 - R_1 T_1}{T_2 - T_1} = \frac{0.11 \times 3 - 0.095 \times 1}{3 - 1}$ $= (0.330 - 0.095) \div 1 = 0.235 \div 2 = 0.1175$	11.75%
3-Year	$= \frac{R_2 T_2 - R_1 T_1}{T_2 - T_1} = \frac{0.1075 \times 4 - 0.095 \times 1}{4 - 1}$ $= (0.43 - 0.095) \div 1 = 0.335 \div 3 = 0.1117$	11.17%

2. Computation of Forward Interest Rates as on 01.04.2012

Tenor of Bond	Computation	Interest Rate
1-Year	$= \frac{R_2 T_2 - R_1 T_1}{T_2 - T_1} = \frac{0.11 \times 3 - 0.1025 \times 2}{3 - 2}$ $= (0.33 - 0.2050) \div 1 = 0.125 \div 1 = 0.125$	12.50%
2-Year	$= \frac{R_2 T_2 - R_1 T_1}{T_2 - T_1} = \frac{0.1075 \times 4 - 0.1025 \times 2}{4 - 2}$ $= (0.43 - 0.2050) \div 2 = 0.225 \div 2 = 0.1125$	11.25%



3. Computation of Forward Interest Rates as on 01.04.2013

Tenor of Bond	Computation	Interest Rate
1-Year	$= \frac{R_2 T_2 - R_1 T_1}{T_2 - T_1} = \frac{0.1075 \times 4 - 0.11 \times 3}{4 - 3}$ $= (0.43 - 0.33) \div 1 = 0.10 \div 1 = 0.10$	10%

Illustration 55.

From the following data for Government securities

Face value (₹)	Interest Rate	Maturity (Year)	Current Price (₹)
1,00,400	0%	1	91,900
1,00,400	10%	2	98,900
1,00,400	10.5%	3	99,400

Calculate the forward rates.

Solution:

1. Computation of Zero Rates [Implied Interest Rate at Time Zero (Under Annual Compounding)]

Particulars	1 Year Bond	2 Year Bond	3 Year Bond
Current Market Price [A]	₹91,900	₹98,900	₹99,400
Redemption Price (assumed at Par Value)	₹1,00,400	₹1,00,400	₹1,00,400
Capital Gain [B]	₹8,500	₹1,500	₹1,000
Rate of Interest	0%	10.00%	10.50%
Annual Interest Inflow	—	₹10,040	₹10,542
Period of Bond [C]	1 Year	2 Years	3 Years
Total Interest Inflow [D]	NIL	₹20,080	₹31,626
Total Income to a Bond Holder [E = B + D]	₹8,500	₹21,580	₹32,626
Income per Annum [F = E ÷ C]	₹8,500 [8,500/1]	₹10,790 [21,580/2]	₹10,875 [32,626/3]
Implied Interest Rate [F ÷ A]	9.25% [8,500/91,900]	10.91% [10,790/98,900]	10.94% [10,875/99,400]

2. Computation of Forward Rates

(a) Forward Rate for Year 1

Forward Rate for Year 1 = Implied Interest rate for One Year Bond = 9.25%

(b) Forward Rate for Year 2

$$R_{F2} = \frac{R_2 T_2 - R_1 T_1}{T_2 - T_1},$$

Factor	Notation	Value
Zero Rate for 1 Year Bond	R_1	9.25%
Zero Rate for 2 Year Bond	R_2	10.91%
Tenor of Bond 1	T_1	1
Tenor of Bond 2	T_2	2
Forward Rate for Year 2	R_F	12.57%
$= \frac{R_2 T_2 - R_1 T_1}{T_2 - T_1} = [(10.91\% \times 2) - (9.25\% \times 1) / 2 - 1]$ $= (21.82\% - 9.25\%) / 1 = 12.57\%$		

(c) Forward Rate for Year 3

$$R_{F2} = \frac{R_2 T_2 - R_1 T_1}{T_2 - T_1},$$

Factor	Notation	Value
Zero Rate for 2 Year Bond	R_2	10.91%
Zero Rate for 3 Year Bond	R_3	10.94%
Tenor of Bond 2	T_2	2
Tenor of Bond 3	T_3	3
Forward Rate for Year 3	R_{F3}	11.00%
$= \frac{R_3 T_3 - R_2 T_2}{T_3 - T_2} = [(10.94\% \times 3) - (10.91\% \times 2) / (3 - 2)]$ $= (32.82\% - 21.82\%) / 1 = 11.00\%$		

Illustration 56.

Suppose a dealer Rupam quotes 'All-in-cost' for a generic swap at 8% against six month LIBOR flat. If the notional principal amount of swap is ₹5,00,000,

1. Calculate Semi-Annual fixed payment.
2. Find the first floating rate payment for (i) above if the six month period from the effective date of swap to the settlement date comprises 91 days and that the corresponding LIBOR was 6% on the effective date of swap.
3. In 2 above, if settlement is on 'Net' basis, how much the fixed rate payer would pay to the floating rate payer?
4. Generic swap is based on 30/360 days basis.

Solution:**Computation of Factors**

Factor	Notation	Value
Notional Principal	P	5,00,000
Time	N	180 days
All in Cost Rate	R	0.08



1. Computation of Semi Annual Fixed Rate Payment

Semi-Annual Fixed Rate Payment = $P \times (N \div 360) \times R$

$$= 5,00,000 \times (180 \div 360) \times 0.08$$

$$= 5,00,000 \times 0.5 \times 0.08 = ₹20,000/-$$

2. Computation of Floating Rate Payment

Floating Rate Payment = $P \times (N_t \div 360) \times \text{LIBOR}$

Where N_t = Period from the effective date of SWAP to the date of Settlement

$$= 5,00,000 \times (91 \div 360) \times 0.06$$

$$= 5,00,000 \times (0.2528) \times 0.06 = ₹7,584.$$

3. Computation of Net Amount

Net Amount to be paid by the Person Requiring Fixed Rate Payment = Fixed Rate Payment Less Floating Rating Payment = ₹20,000 - ₹7,584 = ₹12,416.

Illustration 57.

Interest Rate Swaps — Computation of Cash Flows — Gain Not Shared

Sandip Limited is planning to expand its Cotton Apparel Division, by setting up 100 Looms and installing adequate machinery in Gujrat. It expects the total cost of the project, including cost of the land, to be ₹3 Crores, repayable at the end of the third year.

Fixed Interest Rate 11.00%

Floating Interest Rate MIBOR + 2.5%

Susmita Consumer Goods Ltd (SCDL) is also on an expansion mode. It also requires ₹3 Crores, repayable at the end of the third year.

Fixed Interest Rate 10.00%

Floating Interest Rate MIBOR +1 %

Sandip anticipates a contraction in economy and therefore a reduction in interest rates, and therefore wants to opt for Floating Interest Rate. SCDL is worried about the raising inflation and wants to freeze its interest rate by option choosing Fixed Interest Rate option. Both these Companies enter into an Swap Arrangement.

If interest payments are to be made half-yearly based on interest prevailing at the beginning of the six month period, Mumbai Interbank Offer Rate (MIBOR) today is 10% and rate at the beginning of the next five half years are 9%, 9.50%, 11%, 10% and 8%, ascertain the cash flows. Who has been the biggest beneficiary?

Solution:

Note: For effecting a Swap Arrangement, choice of interest rates with the respective bankers will be based on the rate advantage to the stronger Company in different interest rate schemes. Expectation on economy or on movement of interest rates are not relevant for structuring a swap arrangement.

1. Action and Net Cost

SCDL has an advantage of 1% in Fixed Rate (10% vs. 11%) and 1.50% in Floating Rate. Therefore, SCDL enjoys a higher advantage in Floating Rate loans. Therefore SCDL will opt for Floating Rate Loans with its Bankers. Correspondingly Sandip Ltd will opt for Fixed Rate Loans with its bankers.

SCDL	Sandip Ltd
1. SCDL will borrow at Floating Rate. 2. Pay interest to Bankers at Floating Rate (i.e. MIBOR + 1%) 3. Will collect from /pay to Sandip interest amount differential i.e. Interest computed at Floating Rate (MIBOR+1%) Less Interest Computed at Fixed Rate of 10%. [This different constitutes the gain on account of Swap] 4. Effective Interest Rate: 2-3 $= (\text{MIBOR} + 1\%) - [(\text{MIBOR} + 1\%) - \text{Fixed Rate } 10\%]$ $= \text{MIBOR} + 1\% - \text{MIBOR} - 1\% + \text{Fixed Rate } 10\% = \text{Fixed Rate } 10\%$	1. Sandip will borrow at Fixed Rate. 2. Pay interest to its Bankers at Fixed Rate (i.e. 11%) 3. Will pay to / collect from SCDL interest amount differential i.e. Interest computed at Floating Rate to SCDL (MIBOR + 1%) Less Interest Computed at Fixed Rate to SCDL 10%. [This different constitutes the gain on account of Swap] 4. Effective Interest Rate: 2 + 3 $= \text{Fixed Rate to Sandip } 11\% + \text{MIBOR} + 1\% - \text{Fixed Rate to SCDL } 10\%$ $= 11\% + \text{MIBOR} + 1\% - 10\% = \text{Floating Rate MIBOR} + 2\%$ 5. Gain due to Swap: Interest Rate Payable by Sandip without Swap Less Effective Interest Rate under Swap to Sandip Ltd $\Rightarrow \text{MIBOR} + 2.50\% \text{ Less } \text{MIBOR} + 2.00\%$ Net Gain = 0.50%

Alternatively, Net Gain can be computed as follows —

Difference in Fixed Rate	[11.00% - 10.00%]	1.00%
Less: Difference in Floating Rate	[2.50% - 1%]	1.50%
Net Difference [Maximum Gain]		0.50%

[The difference measures the degree of gain]

2. Cash Flows from SCDL Perspective

Installment No.	MIBOR + 1%	Applicable Rate for Outflow to Bankers [Payable to Banker] [MIBOR + 1%]	Applicable Rate for Outflow to Sandip [Fixed Rate to SCDL]	Net Amount received from / paid to Sandip
(1)	(2)	(3)	(4)	(5) = (3) - (4)
1	10% + 1% = 11.00%	₹16.50 Lakhs [₹3 Crores X 11% x 6/12]	₹15.00 Lakhs [₹3 Crores X 10% x 6/12]	₹1.50 Lakhs
2	9% + 1% = 10.00%	₹15.00 Lakhs [₹3 Crores X 10% X 6/12]	₹15.00 Lakhs [₹3 Crores X 10% X 6/12]	—
3	9.50% + 1% = 10.50%	₹15.75 Lakhs [₹3 Crores X 10.5% X 6/12]	₹15.00 Lakhs [₹3 Crores X 10% X 6/12]	₹ 0.75 Lakhs
4	11% + 1% = 12.00%	₹18.00 Lakhs [₹3 Crores X 12% X 6/12]	₹15.00 Lakhs [₹3 Crores X 10% x 6/12]	₹ 3.00 Lakhs
5	10% + 1% = 11.00%	₹16.50 Lakhs [₹3 Crores X 11% X 6/12]	₹15.00 Lakhs [₹3 Crores X 10% X 6/12]	₹1.50 Lakhs
6	8% + 1% = 9.00%	₹13.50 Lakhs [₹3 Crores X 9% X 6/12]	₹15.00 Lakhs [₹3 Crores X 10% X 6/12]	(₹1.50 Lakhs)
		₹95.25 Lakhs	₹90.00 Lakhs	₹5.25 Lakhs



Summary of Cash Flow:

Total Interest Payable by SCDL = ₹95.25 Lakhs, sourced by —

1. Own Funds = ₹90.00 Lakhs [Net Cost to SCDL]

2. Inflow from Sandip = ₹5.25 Lakhs

Net Interest Cost to SCDL = Interest Payable on Fixed Rate only (gains are not shared)

3. Cash Flows from Sandip's Perspective

Installment No.	Amount Payable to Bankers [At Fixed Rate i.e. 11%]	Net Amount Paid to / Received from SCDL on account Interest Rate Swap	Total Cash Flow on Account of Interest
(1)	(2)	(3)	(4) = (2) + (3)
1	₹16.50 Lakhs [₹3 Crores X 11% X 6/12]	₹1.50 Lakhs	₹18.00 Lakhs [16.5 + 1.5]
2	₹16.50 Lakhs [₹3 Crores X 11% X 6/12]	—	₹16.50 Lakhs [16.5 + 0]
3	₹16.50 Lakhs [₹3 Crores X 11% X 6/12]	₹0.75 Lakhs	₹17.25 Lakhs [16.5 + 0.75]
4	₹16.50 Lakhs [₹3 Crores X 11% X 6/12]	₹3.00 Lakhs	₹19.50 Lakhs [16.5 + 3]
5	₹16.50 Lakhs [₹3 Crores X 11% X 6/12]	₹1.50 Lakhs	₹18.00 Lakhs [16.5 + 1.5]
6	₹16.50 Lakhs [₹3 Crores x 11% x 6/12]	(₹1.50 Lakhs)	₹15.00 Lakhs [16.5-1.5]
	₹99.00 Lakhs	₹5.25 Lakhs	₹104.25 Lakhs

4. Amount Saved on Interest Outgo

Installment No.	MIBOR Rates + 2.5%	Amount Payable to Bankers [At Floating Rate]	Amount of Interest Actually Paid	Total Cash Flow on Account of Interest
(1)	(2)	(3)	(4)	(5) = (3)-(4)
1	10% + 2.50% = 12.5%	₹18.75 Lakhs [₹3 Crores X 12.5% X 6/12]	₹18.00 Lakhs [16.5 + 1.5]	₹0.75 Lakhs [18.75 - 18.00]
2	9% + 2.50% = 11.5%	₹17.25 Lakhs [₹3 Crores X 11.5% X 6/12]	₹16.50 Lakhs [16.5 + 0]	₹0.75 Lakhs [17.25 - 16.50]
3	9.5% + 2.5% = 12.0%	₹18.00 Lakhs [₹3 Crores X 12% X 6/12]	₹17.25 Lakhs [16.5 + 0.75]	₹0.75 Lakhs [18-17.25]
4	11%+ 2.5% = 13.5%	₹20.25 Lakhs [₹3 Crores X 13.5% X 6/12]	₹19.50 Lakhs [16.5 + 3]	₹0.75 Lakhs [20.25 - 19.50]
5	10% + 2.5% = 12.5%	₹18.75 Lakhs [₹3 Crores X 12.5% X 6/12]	₹18.00 Lakhs [16.5 + 1.5]	₹0.75 Lakhs [18.75 - 18]
6	8% + 2.5% = 10.5%	₹15.75 Lakhs [₹3 Crores X 10.5% X 6/12]	₹15.00 Lakhs [16.5 - 1.5]	₹0.75 Lakhs [15.75 - 15]
		₹108.75 Lakhs	₹104.25 Lakhs	₹4.50 Lakhs

Alternatively:

Amount Saved on Interest Outgo = Amount of Loan X Net Gain in % (Annualized) X Period in Years

= ₹3 Crores X 0.50% per annum X 3 Years

= ₹4.50 Crores

Illustration 58.

United Bankers Ltd offer the following interest rates to two of its customers for a loan of ₹100 Crores, repayable in 7 Years —

Company	Somnath Ltd	Amal IT Services Ltd
Nature of Activity	Supply and Installation of Security Systems for Home, Office, Corporate Surveillance and other Security Services and products	Providing IT support to various Airlines, Shipping Companies and Government Companies
Years in Industry	25	1.5
Market Position	Market Leaders	Market Entrants (Infant)
Rating by UBL	A++	B+
Floating Interest Rate	MIBOR - 0.50%	MIBOR + 1%
Fixed Interest Rate	10.00%	12.50%
Share in the Net Gain on account of Interest Rate Swap	60%	40%

Assuming, principal amount is repaid at the end of the seven years, what is the effective gain in percentage as well as in value for both the Companies, if they enter into an Swap Arrangement for reducing interest effect.

Also ascertain the net interest cost (in %) for both the Companies.

Solution:

Note: For effecting a Swap Arrangement, choice of interest rates with the respective bankers will be based on the rate advantage to the stronger Company in different interest rate schemes. Expectation on economy or on movement of interest rates are not relevant for structuring a swap arrangement.

1. Action and Net Cost

Somnath has an advantage of 2.50% in Fixed Rate (10% vs. 12.50%) and 1.50% in Floating Rate. Therefore, Somnath enjoys a higher advantage in Fixed Rate loans. Therefore, SCDL will opt for Fixed Rate Loans with its Bankers. Correspondingly Amal Ltd will opt for Floating Rate Loans with its bankers.



Somnath	Amal
1. Somnath will borrow at Fixed Rate.	1. Amal will borrow at Floating Rate.
2. Pay interest to Bankers at Fixed Rate (i.e 10%) [Outflow]	2. Pay interest to its Bankers at Floating Rate (i.e. MIBOR + 1%) [Outflow]
3. Will collect from / pay to Amal interest amount differential i.e. Interest computed at Fixed Rate (10%) Less Interest Computed at Floating Rate (MIBOR - 0.50%) i.e. (10.50% - MIBOR) [Inflow]	3. Will pay to / collect from Somnath interest amount differential i.e. Interest computed at Fixed Rate to Platinum (10%) Less Interest Computed at Floating Rate to Somnath (MIBOR - 0.50%) i.e. (10.50% - MIBOR) [Outflow]
4. Will collect from Amal share in the gain on account of interest rate swap i.e. 60% of difference in the spread of Fixed Rate and Floating Rate [Inflow] [See Note]	4. Will pay to Somnath share in the gain on account of interest rate swap i.e. 60% of difference in spread of 1% i.e. 0.60% [Outflow]

Gain on Account of Interest Rate Swap:

Spread in Fixed Rate	[12.50% - 10.00%]	2.50%
Less: Difference in Floating Rate	[1% - (-0.50%)]	1.50%
Net Difference	[Maximum Gain]	1.00%
Share of Somnath in the Gain	[60% of 1%]	0.60% p.a.
Share of amal in the Gain	[40% of 1%]	0.40% p.a.

2. Effective Interest Rate

Particulars	Somnath Ltd	Amal IT Services
Expectation on Interest Rate	Contraction	Increase
Interest Rate Scheme (Desired)	Floating Rate	Fixed Rate
Interest Rate	MIBOR - 0.50%	12.50%
Less: Share in Gain	0.60%	0.40%
Effective Interest Rate	MIBOR-1.10%	12.10%

3. Interest Cost Saved

(in ₹)

Particulars	Somnath Ltd	Amal IT Services
Share in Gain (p.a.)	0.60%	0.40%
Amount of Loan	₹100 Crores	₹100 Crores
Interest Savings per Annum	₹60 Lakhs [₹100 Crores x 0.60%]	₹40 Lakhs [₹100 Crores X 0.40%]
Number of Years of Loan	7 Years	7 Years
Total Interest Savings	₹4.20 Crores [7 X ₹0.60 Crore]	₹2.80 Crores [7 X ₹0.40 Crore]

Illustration 59.

Structure a Swap Arrangements in the following situations and also ascertain the extent of gain —

Case	Company D			Company E		
	Interest Rates		Expectation on Interest Rate	Interest Rates		Expectation on Interest Rate
	Floating	Fixed		Floating	Fixed	
1	PLR + 0.50%	12.00%	Increase	PLR + 0.50%	11.00%	Increase
2	PLR + 1.00%	11.00%	Decrease	PLR + 2.00%	12.00%	Increase
3	PLR + 1.25%	11.25%	Decrease	PLR - 0.50%	10.75%	Decrease
4	PLR - 1.50%	10.00%	Increase	PLR - 0.50%	11.50%	Decrease

PLR refers to Prime Lending Rate of a Bank i.e. Benchmark Lending rate, which are altered from time to time by the Banks.

Solution:

Case	Evaluation on Interest Rates	Structure of Swap	Extent of Gain
1	- Fixed Rate Spread = 12.00% - 11.00% = 1.00% - Floating Rate Spread = 0.50% - 0.50% = 0 - Difference in Spread = 0.50% Possibility of Gain on Swap: Yes	E is the stronger Company (due to interest rate advantage). E has an advantage of 1% in Fixed Rate and no advantage in Floating Rate. Therefore, E Ltd. should opt for Fixed Rate and D Ltd. opt for Floating Rate with their Bankers.	Total Gain = 1.00%
2	- Fixed Rate Spread = 12.00% - 11.00% = 1.00% - Floating Rate Spread = 2.00% - 1.00% = 1.00% - Difference in Spread = 0% Possibility of Gain on Swap: No	Swap arrangement will not lead to any interest advantage. Therefore, no viable swap arrangement can be structured.	Total Gain = 0
3	- Fixed Rate Spread = 11.25% - 10.75% = 0.50% - Floating Rate Spread = 1.25% - (-0.50%) = 1.75% - Difference in Spread = 1.25% Possibility of Gain on Swap: Yes	E is the stronger Company (due to interest rate advantage). E has an advantage of 0.50% in Fixed Rate and 1.75% advantage in Floating Rate. Therefore, E Ltd should opt for Floating Rate and D Ltd opt for Fixed Rate with their Bankers.	Total Gain = 1.25%
4	- Fixed Rate Spread = 11.50% - 10.00% = 1.50% - Floating Rate Spread = 1.50% - 0.50% = 1.00% - Difference in Spread = 0.50% Possibility of Gain on Swap: Yes	D is the stronger Company (due to interest rate advantage). D has an advantage of 1.50% in Fixed Rate and 1.05% advantage in Floating Rate. Therefore, D Ltd should opt for Fixed Rate and E Ltd opt for Floating Rate with their Bankers.	Total Gain = 0.50%



Illustration 60.

Companies X and Y face the following interest rates:

	X	Y
U.S. Dollars (floating rate)	LIBOR + 0.5%	LIBOR+ 1.0%
Canadian (fixed rate)	5.0%	6.5%

X wants to borrow U.S. Dollars at a floating rate of interest and Y wants to borrow Canadian dollars at a fixed rate of interest.

X financial institution is planning to arrange a swap and requires a 50 basis point spread.

If the swap is attractive to X and Y at 60 : 40 ratio, what rates of interest will X and Y end up paying?

Solution:

Particulars	Value
1. Difference in Floating Rates [(LIBOR + 1%) - (LIBOR + 0.5%)]	0.5%
2. Difference in Fixed Rates [6.5% - 5%]	1.5%
3. Net Difference {[(a) - (b)] in Absolute Terms}	1.0%
4. Amount paid for arrangement of Swap Option	(0.5%)
5. Net Gain [(c) - (d)]	0.5%
6. Company X's share of Gain [0.5% X 60%]	0.3%
7. Company Y's share of Gain [0.5% X 40%]	0.2%

Company X	Company Y
1. Company X will borrow at Fixed Rate.	1. Company Y will borrow at Floating Rate.
2. Pay interest to Bankers at Fixed Rate (i.e. 5.0%)	2. Pay interest to its Bankers at Floating Rate (i.e. LIBOR+1.0%)
3. Will collect from Company B interest amount differential i.e. Interest computed at Fixed Rate (5.0%) Less Interest Computed at Floating Rate of (LIBOR+0.5%) = 4.5% - LIBOR	3. Will pay interest amount differential to Company X i.e. Interest computed at Fixed Rate (5.0%) Less Interest Computed at Floating Rate of (LIBOR+0.5%) = 4.5% - LIBOR
4. Receive its share of Gain from Company Y = 0.3%	4. Pay to Company X its share of Gain = 0.2%
5. Effective Interest Rate: 2 - 3 - 4 = Fixed Rate paid by Company X - Interest Differential Received from Company Y - Share of Gain. = (5.0%) - (4.5% - LIBOR) - 0.3% = LIBOR + 0.2%	5. Pay Commission Charges to the Financial Institution for arranging Interest Rate Swaps i.e. 0.5%
	6. Effective Interest Rate: 2 + 3 + 4 + 5 = Floating Rate to Company Y (LIBOR+1.0%) + Interest Differential paid to Company X (4.5% - LIBOR) + Share of Gain paid to Company X (0.25%) + Commission charges paid (0.5%) = LIBOR + 1.0 % + 4.5% - LIBOR + 0.2% + 0.5% = 6.2%

Illustration 61.

Company PQR and DEF have been offered the following rate per annum on a \$ 200 million five year loan;

Company	Fixed Rate	Floating Rate
PQR	12.0	LIBOR+ 0.1%
DEF	13.4	LIBOR + 0.6%

Company PQR requires a floating - rate loan; Company DEF requires a fixed rate loan.

Design a swap that will net a bank acting as intermediary at 0.5 percent per annum and be equally attractive to both the companies.

Solution:

Particulars	₹
(a) Difference in Floating Rates [(LIBOR + 0.1%) - (LIBOR + 0.6%)]	0.5%
(b) Difference in Fixed Rates [13.4% - 12%]	1.4%
(c) Net Difference {[(a) - (b)] in Absolute Terms}	0.9%
(d) Amount paid for arrangement of Swap Option	(0.5%)
(e) Net Gain [(c) - (d)]	0.8%
(f) Company PQR's share of Gain [0.8% X 50%]	0.4%
(g) Company DEF's share of Gain [0.8% X 50%]	0.4%

PQR is the stronger Company (due to comparative interest advantage). PQR has an advantage of 1.40% in Fixed Rate and 0.50% in Floating Rate. Therefore, PQR enjoys a higher advantage in Fixed Rate loans. Therefore, PQR will opt for Fixed Rate Loans with its Bankers. Correspondingly DEF Ltd will opt for Floating Rate Loans with its bankers.

Company PQR	Company DEF
- Company PQR will borrow at Fixed Rate. - Pay interest to Bankers at Fixed Rate (i.e. 12.0%) - Will collect from Company DEF interest amount differential i.e. Interest computed at Fixed Rate (12.0%) Less Interest Computed at Floating Rate of (LIBOR + 0.1%) = 11.9% - LIBOR - Receive share of Gain from Company DEF (0.4%) Effective Interest Rate: 2 - 3 = 12.0% - (11.90% - LIBOR) - 0.4% = LIBOR - 0.3%	- Company DEF will borrow at Floating Rate. - Pay interest to its Bankers at Floating Rate (i.e. LIBOR + 0.6%) - Will pay to Company PQR interest amount differential i.e. Interest computed at Fixed Rate (12.0%) Less Interest Computed at Floating Rate of (LIBOR + 0.1%) = 11.9% - LIBOR - Pay to Company PQR its share of Gain = 0.4% - Pay Commission Charges to the Financial Institution for arranging Interest Rate Swaps i.e. 0.5% Effective Interest Rate: 2 + 3 + 4+5 = Floating Rate to Company DEF (LIBOR + 0.6%) + Interest Differential paid to Company PQR (11.9% - LIBOR) + Commission charges paid for arranging Swaps + Share of gain paid to Company PQR = LIBOR + 0.60 % + 11.9% - LIBOR + 0.5% + 0.4% = 13.4%



Illustration 62.

Consider that a bank sells a 3 x 6 FRA worth \$3,000,000. The agreed rate with the buyer is 5.5 percent. There are actually 92 days in the three-month FRA period. Assume that three months from today the settlement rate is 4-7/8 percent. Determine how much the FRA is worth and who pays who i.e. whether the buyer pays the seller or seller pays the buyer. Had the settlement rate been 6-1/8 percent, what is the answer?

Solution:

A seller of a FRA would benefit if the settlement rate is lower than the agreed rate. Since the settlement rate is less than the agreement rate, the buyer pays the seller the absolute value of the FRA. The payoff of the FRA is:

$$\text{Payoff} = \text{Notional Amount} \times \frac{(\text{Reference Rate} - \text{Fixed Rate})}{1 + \text{Reference Rate} \times \alpha} \quad (\alpha \text{ is the day count function})$$

$$\begin{aligned} &= 3,00,00,000 \times \frac{(0.04875 - 0.055) \times 92/360}{1 + 0.04875 \times 92/360} \\ &= \$ 4,732.05 \end{aligned}$$

Had the settlement rate been 6.125%, since the settlement rate is greater than the agreement rate, the seller pays the buyer the absolute value of the FRA. The absolute value of the FRA is:

$$\begin{aligned} &= 3,00,00,000 \times \frac{(0.04875 - 0.055) \times 92/360}{1 + 0.04875 \times 92/360} \\ &= \$4,717.16. \end{aligned}$$

Illustration 63.

On January 25, a European Bank wants USD 100 million of 6-month deposit. However, it is offered USD 100 million of 9-month deposit at the bank's bid rate. At the current market, the other rates are these:

	Cash			FRA	
	Bid	Ask		Bid	Ask
6 Months	10.4375	10.5625	6 x 9	10.48	10.58
9 Months	10.5625	10.6875			

Should the bank take the 9-month deposit? Explain with calculations and payoff.

Solution:

The bank wants a six month deposit of \$100 million. Therefore it can be construed that it would have funds of \$100 million at the end of six months so as to repay the six month deposit if it was available.

However, only nine month deposit is available, meaning that it would have the obligation to repay after nine months. Thus the bank would have funds to lend for three months starting 6 months today for the period of three months. Thus the bank can sell 6 x 9 FRA thereby converting the 9-month deposit to a 6-month deposit. That is, the bank sells off (lends) the last 3-month in the FRA market. Days from January 25 to September 25 (9-month deposit) = 273 days. Days from June 25 to September 25 (6 X 9 FRA) = 92 days

The interest that would be paid at the end of nine months to the depositor is:

$$\$100 \text{ million} \times (0.105625) \times (273/360) = \text{USD } 8,009,895.83.$$

Interest earned on lending for 6-month in the interbank market, then another 3-month at the FRA rate is:

$$\$100,000,000 \times [(1+0.104375 \times (181/360)) \times (1+0.1048 \times (92/360)) - 1] = \$8,066,511.50.$$

Thus there is a net profit of \$56,615.67 at the end of nine months. In this scenario, profit is possible, but arbitrage is not possible.

Illustration 64.

MNC rolls over a \$25 million loan priced at LIBOR on a three-month basis. The company feels that interest rates are rising and that rates will be higher at the next roll-over date in three months. Suppose the current LIBOR is 5.4375%. Explain how MNC can use FRA at 6% offered by a bank to reduce its interest rate risk on this loan. In three months, if interest rates have risen to 6.25%, how much will MNC receive/pay on its FRA? Assume the three month period as 90 days.

Solution:

MNC can use 3 x 6 FRA, if it expects that the rates would be higher at the next roll-over of three months, starting three months from today. In other words MNC would buy 3 x 6 FRA @ 6.25%, clearly with a view that higher rate would prevail on the settlement date i.e. 3 months from now.

Now if on the settlement date, the rate is 6.5%, then MNC's decision to buy 3 x 6 FRA has been proved right and it would receive the present value of the interest differentials on the loan amount i.e. it would receive:

$$\begin{aligned} \text{Payoff} &= \text{Notional Amount} \times \frac{(\text{ReferenceRate} - \text{FixedRate})}{1 + \text{ReferenceRate} \times \alpha} \quad (\alpha \text{ is the day count function}) \\ &= \$2,50,00,000 \times \frac{(0.065 - 0.0625) \times 90/360}{1 + 0.0625 \times 90/360} = \$15,385 \end{aligned}$$

Illustration 65.

Company A has outstanding debt on which it currently pays fixed rate of interest at 9.5%. The company intends to refinance the debt with a floating rate interest. The best floating rate it can obtain is LIBOR + 2%. However, it does not want to pay more than LIBOR. Another company B is looking for a loan at a fixed rate of interest to finance its exports. The best rate it can obtain 13.5%, but it cannot afford to pay more than 12%. However, one bank has agreed to offer finance at a floating rate of LIBOR + 2%. Citibank is in the process of arranging an interest rate swap between these two companies.

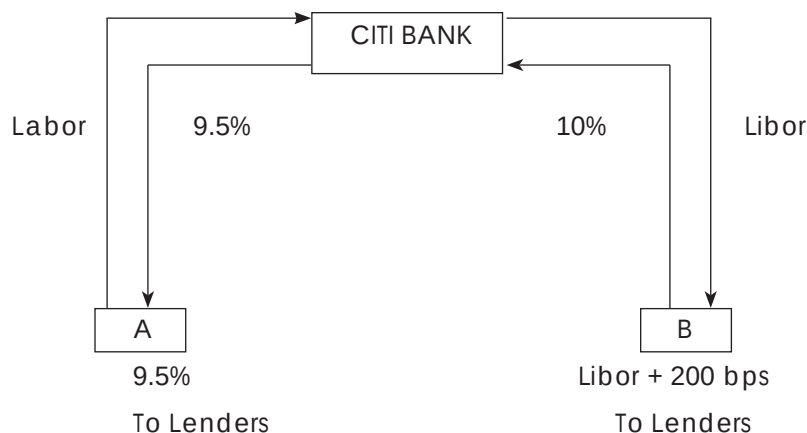
- With a schematic diagram, show how the swap deal can be structured,
- What are the interest savings by each company?
- How much would Citi bank receive?



Solution:

First let us tabulate the details to find the quality spread differential:

Cost of Funds to Company A and B			
	Objective	Fixed rate	Floating rate
Company A	Floating	9.50% p.a.	Libor + 200bp
Company B	Fixed	13.50% p.a.	Libor + 200bp
Differential		400 bps	0bps



The differential between the two markets = 400 bps - 0 = 400 bps. A total of 400 bps needs to be shared between A, B and Citi bank. Since A cannot afford to pay more than Libor, it needs 200 bps benefits out of the total 400 bps (Libor + 2% - Libor). Similarly B cannot pay more than 12% as against the existing available fixed rate funding of 13.5%, it requires 150 bps benefits out of 400 bps. The balance 50 bps would be shared / charged by the Citi bank.

The swap can therefore be structured as follows:

Firm	Paid to Bank	Received from Bank	Paid to market	Net Cost	Savings
A	Libor	9.5%	9.5%	Libor	(Libor + 2%) - (Libor) = 200bps
B	10%	Libor	Libor + 200bps	12%	(13.5 - 12.0) = 150bps

Company A gets floating rate funds at Libor as against Libor + 2%, thereby getting an advantage of 200 bps, Company B gets fixed rate funds at 12% as against 13.5%, thereby getting an advantage of 150 bps and finally Citi bank gets 50 bps commission.

Illustration 66.

Company X wishes to borrow U.S. dollars at a fixed rate of interest. Company Y wishes to borrow Japanese yen at a fixed rate of interest. The amount required by the two companies are roughly the same at the current exchange rate. The companies have been quoted the following interest rates:

	Yen	Dollars
Company X	6.0%	9.6%
Company Y	7.5%	10.0%

Design a swap that will net a bank, acting as an intermediary, 50 basis points per annum. Make the swap appear equally attractive to the two companies.

Solution:

Let x be the spread in the yen market (in this case 150 basis points) and let y be the spread in the dollar market (40 basis points). The total gain available is $x - y = 110$ basis points. The bank will take 50 basis points, so that leaves 60 basis points to be split equally between x and y . Therefore, x must end up paying 9.3% in dollars and y must end up paying 7.2% in yen. One way to accomplish this is as follows:

X	Pay 6% in yen to outside lenders
	Pay 9.3% in dollars to the bank in the swap
	Receive 6% in yen from the bank in the swap
Total	9.3% in dollars
Y	Pay 10% in dollars to outside lenders
	Pay 7.2% in yen to the bank in the swap
	Receive 10% in dollars from the bank in the swap
Total	7.2% in yen

Note that the bank's profits of 50 basis points come from receiving 7.2% and paying 6% in yen (thereby gaining 120 basis points in yen) while receiving 9.3% and paying 10% in dollars (thus losing 70 basis points in dollars). Also, the final exchange of principal will expose X and Y to exchange rate risk, but not the bank.

Illustration 67.

Suppose a dealer Khan quotes 'All-in-cost' for a generic swap at 8% against six 3 months Libor flat. If the notional "principal amount of swap is ₹ 10,00,000,

1. Calculate semi-annual fixed payment.
2. Find the first floating rate payment for (i) above if the six month period from the effective date of swap to the settlement date comprises 181 days and that the corresponding Libor was 6% on the effective date of swap.
3. In (ii) above, if the settlement is on 'Net' basis, how much the fixed rate payer would pay to the floating rate payer?

[Generic swap is based on 30/360 days basis.]

Solution:

1. The general formula for calculating the semiannual fixed rate payment is:

$$(N)(AIC) (180/360)$$
Where N, denotes the notional principal amount of the agreement. Thus each fixed rate payment would be = $10,00,000 \times 0.08 \times 180/360 = ₹40,000$.
2. The general formula for calculating the floating rate payment is:

$$(N)(LIBOR)(d_t/360)$$
Where N, denotes the notional principal amount of the agreement. Thus each floating rate payment would be = $10,00,000 \times 0.06 \times 181/360 = ₹30,166.67$.
3. If the settlement is on 'Net' basis, the fixed rate payer would pay = ₹4,916.67 ($40,000 - 30,166.67$) = 9,833.33 to the floating rate payer



Illustration 68.

Amit Company has borrowed \$200 million on floating basis for 3 years. The interest rates are reset every year. The spread over LIBOR is 25 bps. The company buys a 3 year cap on a 1-year LIBOR with a strike rate of 9% and having a face value of \$200 million. The cap carries a premium of 2% of face value or \$4 million. Current 1 year LIBOR is 9%. If the LIBOR at the end of 1, 2 and 3 years are 9.5%, 8.5% and 10%, what is the cash flow from cap each year? Amortize premium equally over three years.

Solution:

The strike rate of the cap is Libor which is currently 9%. Since the spread over Libor is 25 bps, the interest rate applicable on the borrowing would be 9.75%, 8.75% & 10.25% respectively for the three years. Thus the interest payable in amount terms over three years would be: \$1,95,00,000, \$1,75,00,000 and \$2,05,00,000 respectively. Now, the premium paid for buying this cap is \$ 4 million. As given in the problem equal amortization would involve \$13,33,333 each year. The seller of the cap would part with the difference whenever Libor is above the strike price. Therefore we can construct the cash flow table as follows:

Time	Cash Flow - Loan	Amortization of premium	Cash Flow from Cap	Total
0	+20,00,00,000	—	—	+20,00,00,000
1	-1,95,00,000	-13,33,333	+10,00,000	-1,98,33,333
2	-1,75,00,000	-13,33,333	—	-1,88,33,333
3	-2,05,00,000	-13,33,333	+20,00,000	-1,98,33,333
4	-20,00,00,000	—	—	-20,00,00,000

Illustration 69.

A fund manager Mr. Aditya deposited \$200 million on floating basis for 3 years, which pay LIBOR + 50 bps. The interest rates are reset every year. The company buys a 3 year floor on a 1-year LIBOR with a strike rate of 8% and having a face value of \$200 million. The floor carries a premium of 1.5% of face value or \$3 million. Current 1 year LIBOR is 8.60%. If the LIBOR at the end of 1, 2 and 3 years are 7.5%, 9% and 7%, what is the cash flow from floor each year? Amortize premium equally over three years.

Solution:

The strike rate of the floor is Libor which is currently 8.6%. The interest rate applicable on the deposit would be Libor + 50 bps i.e. 50 bps over 7.5%, 9% & 7% respectively for the three years. Thus the interest payable in amount terms over three years would be: \$1,60,00,000, \$1,90,00,000 and \$1,50,00,000 respectively. Now, the premium paid for buying this floor is \$ 3 million. As given in the problem equal amortization would involve \$10,00,000 each year. The seller of the floor would part with the difference whenever the Libor is below the strike price of 8%. Therefore we can construct the cash flow table as follows:

Time	Cash Flow - Deposit	Amortization of Premium	Cash Flow from Floor	Total
0	-20,00,00,000	—	—	-20,00,00,000
1	+1,60,00,000	-10,00,000	+10,00,000	+1,60,00,000
2	+1,90,00,000	-10,00,000	—	+1,80,00,000
3	+1,50,00,000	-10,00,000	+20,00,000	+1,60,00,000
4	+20,00,00,000	—	—	+20,00,00,000

Illustration 70.

DY has purchased ₹400 million cap (i.e., call options on interest rates) of 9 percent at a premium of 0.65 percent of face value. ₹400 million floor (i.e., put options on interest rates) of 4 percent is also available at premium of 0.69 percent of face value.

- If interest rates rise to 10 percent, what is the amount received by DY? What are the net savings after deducting the premium?
- If DY also purchases a floor, what are the net savings if interest rates rise to 11 percent? What are the net savings if interest rates fall to 3 percent?
- If, instead, DY sells (writes) the floor, what are the net savings if interest rates rise to 11 percent? What if they fall to 3 percent?
- What amount of floors should it sell in order to compensate for its purchases of caps, given the above premiums?

Solution:

- Premium for purchasing the cap = $0.0065 \times ₹400 \text{ million} = ₹26,00,000$. If interest rates rise to 10 percent, cap purchasers receive $₹400 \text{ million} \times 0.01 = ₹40,00,000$. The net savings is $₹14,00,000$.
- If DY also purchases the floor: Premium = $0.0069 \times ₹400 \text{ million} = ₹27,60,000$, and the total premium = $₹27,60,000 + ₹26,00,000 = ₹53,60,000$.

If interest rates rise to 11 percent, cap purchasers receive $0.02 \times ₹400\text{m} = ₹80,00,000$ and the net savings = $₹80,00,000 - ₹53,60,000 = ₹26,40,000$.

If interest rates fall to 3 percent, floor purchaser receive $0.01 \times ₹400 \text{ million} = ₹40,00,000$ and the net savings = $₹40,00,000 - ₹53,60,000 = -₹13,60,000$.

- If DY sells the floor, it receives net $₹27,60,000$ minus the cost of the cap of $₹26,00,000 = +₹1,60,000$.
If interest rates rise to 11 percent, cap purchasers receive $0.02 \times ₹400\text{m} = ₹80,00,000$. The net the net savings = $₹80,00,000 + ₹1,60,000 = ₹81,60,000$.
If interest rates fall to 3 percent, floor purchasers receive $0.01 \times ₹400 \text{ million} = ₹40,00,000$. The net savings to DY = $₹-40,00,000 + ₹1,60,000 = -₹38,40,000$.
- DY needs to sell: $X \times 0.0069 = ₹26,00,000$, or $X = ₹37,68,11,594$ worth of 4 percent floors.

Illustration 71.

Suppose Shampa just signed a purchase and sale agreement on a new home and you have six weeks to obtain a mortgage. Interest rates have been falling, so fixed-rate loans are now very attractive. Shampa could lock in a fixed rate of 7% (annual percentage rate) for 30 years. On the other hand, rates are falling, so Shampa is thinking about a 30-year variable-rate loan, which is currently at 4.5% and which is tied to the six-month Treasury bill rate. A final mortgage option is a variable-rate loan that begins at 5% and cannot fall below 3% but that can increase by only as much as 2% per year up to a maximum of 11%.

- If you wanted to take advantage of a possible fall in rates but not assume the risk that rates would increase dramatically, which financing plan would you choose?
- What is the interest rate cap in this example?
- What is the interest rate floor in this example?
- How is an interest rate cap like buying insurance? How is she paying for this insurance?

**Solution:**

- a) You would take the plan that begins with a variable rate of 5% and can't go above 1.1%.
- b) Cap = 11%.
- c) Floor = 3%.
- d) An interest rate cap is like buying insurance because you still benefit from falling rates, but you will never have to pay an interest rate above 11%. You pay for that with a higher initial variable rate of 5% versus 4.5%.

Illustration 72.

A British airline company has decided to take a 3-year floating rate loan of British \$1,000 million to finance its acquisition. The loan is indexed to 6 month British \$ LIBOR with a spread of 75 basis points. The company has identified the following caps and floors quoted by a Bank:

Particulars	Cap		Floor	
	3- years	3- years	3- years	3- years
Underlying interest rate	6 months US \$ LIBOR	6 months US \$ LIBOR	6 months US \$ LIBOR	6 months US \$ LIBOR
Strike rate	3.0%	3.75%	3.25%	3.75%
Premium	2.0%	1.5%	1.25%	2.0%
Face value	US \$1,000 million	US \$1,000 million	US \$1,000 million	US \$1,000 million

You are required to show how the company can hedge its interest rate exposure by using an interest rate collar strategy. Also calculate the effective cost of the loan showing all the relevant cash flows if the 6 month US \$ LIBOR at the 6 reset dates turn out to be: 3.85%, 4.10%, 3.50%, 3.30%, 3.10%, and 3.00%.

(Use a discount rate of 4% to amortize the premium).

Solution:

The company should go for interest rate collar i.e. it should buy the cap at a higher strike rate and sell the floor at the lower strike rate. Therefore, the company should buy cap at the strike rate of 3.75% and sell floor at the strike rate of 3.25%.

$$\begin{aligned}\text{Net premium outflow} &= (1.5\% - 1.25\%) \text{ of } \$1,000 \text{ million} \\ &= \$25,00,000\end{aligned}$$

$$\text{Amortization of premium} = \frac{\$25,00,000}{\text{PVIFA}(2.00\%, 6)} = \frac{25,00,000}{5.6014} = \$4,46,314$$

Time	LI-BOR (%)	Interest rate applicable to loan (%)	Cash flow on loan	Amortization of premium	Cash flow from Cap	Cash flow from floor	Net cash flow
		+ 1,00,00,00,000					+ 1,00,00,00,000
1	3.85	4.60	-2,30,00,000	-4,46,314	+5,00,000	-	-2,29,46,314
2	4.10	4.85	-2,42,50,000	-4,46,314	+17,50,000	-	-2,29,46,314
3	3.50	4.25	-2,12,50,000	-4,46,314	-	-	-2,16,96,314
4	3.30	4.05	-2,02,50,000	-4,46,314	-	-	-2,06,96,314
5	3.10	3.85	-1,92,50,000	-4,46,314	-	-7,50,000	-2,04,46,314
6	3.00	3.75	-(1,87,50,000 + 1,00,00,00,000)	-4,46,314		-12,50,000	1,02,04,46,314

Effective cost 'r' is given by the following equation :

$$1,00,00,00,000 = 2,29,46,314 \text{ PVIF}(r,1) + 2,29,46,314 \text{ PVIF}(r, 2) + 2,16,96,314 \text{ PVIF}(R, 3) + 2,06,96,314 \text{ PVIF}(r, 4) + 2,04,46,314 \text{ PVIF}(r, 5) + 1,02,04,46,314 \text{ PVIF}(r, 6)$$

At $r = 2\%$, L.H.S. = 1,00,87,62,763.6

At $r = 3\%$, L.H.S. = 95,43,95,576.979

Applying interpolation, $\frac{3 - 2}{3 - x} = \frac{95,43,95,576.979 - 1,00,87,62763.6}{95,43,95,576.979 - 1,00,00,00,000} = 2.16\% (\text{Approx})$

Annualized rate = $(1.0216)^2 - 1 = 4.37\%$

Study Note - 8

FINANCIAL RISK MANAGEMENT IN INTERNATIONAL OPERATIONS



This Study Note includes

- 8.1 Foreign Exchange Market
- 8.2 Foreign Exchange Rate Management
- 8.3 Parity Conditions in International Finance
- 8.4 Exchange Rate Risk Management
- 8.5 Foreign Investment Analysis
- 8.6 Sources of Foreign Currency
- 8.7 Foreign Investment in India
- 8.8 Taxation Issues in Cross-Border Financing and Investment
- 8.9 International Transfer Pricing

International finance (also referred to as **international monetary economics** or **international macroeconomics**) is the branch of financial economics broadly concerned with monetary and macroeconomic interrelations between two or more countries. International finance examines the dynamics of the global financial system, international monetary systems, balance of payments, exchange rates, foreign direct investment, and how these topics relate to international trade.

Sometimes referred to as multinational finance, international finance is additionally concerned with matters of international financial management. Investors and multinational corporations must assess and manage international risks such as political risk and foreign exchange risk, including transaction exposure, economic exposure, and translation exposure.

Some examples of key concepts within international finance are the Mundell–Fleming model, the optimum currency area theory, purchasing power parity, interest rate parity, and the international Fisher effect. Whereas the study of international trade makes use of mostly microeconomic concepts, international finance research investigates predominantly macroeconomic concepts.

International macroeconomics (or international finance) as a subject covers many topical issues. What has happened (what will happen) to the dollar? Is the current account deficit too large? Should China devalue its yuan? Should it first liberalize financial flows? Should Sweden give up its currency to join the euro? Should emerging market economies liberalize their financial markets? Is this good for world economic growth, or a source of instability? How, if at all, should we reform the IMF? What about globalization? These are interesting questions. To answer them we need to learn some international finance. What is this field about?

As with international trade, international macro is the result of the fact that economic activity is affected by the existence of nations. If there were no national economies then we would not have this field. If there was no international trade we would not need international macro either. But countries do trade with each other, and because countries (not all, but many) use their own currencies we have to wonder about how these goods are paid for and what determines the prices that currencies trade at. More subtly, however, we have to also consider the fact that countries borrow and lend from each other: in other words, they trade inter-temporally – consumption today for consumption in the future. Because of international borrowing and lending economic opportunities are expanded and households have better options to smooth their incomes.

These are good things. But just as the existence of banks make bank panics possible, the existence of an international financial system makes international financial crises possible. This is where all the interesting action of the course comes from. In order to understand such crises we need to understand the nature of the international financial system.

It is useful to begin with some general facts about the international economy. First some magnitudes. Foreign Exchange is the biggest market in the world, \$1.5 trillion per day. Exports and imports are much smaller, about \$1.437 and \$2.220.6 trillion annually. Net exports are thus about -\$783.1 billion. Compared to that federal government expenditures are about \$921.8 billion, of which \$617 billion is defense spending, while gross private investment is about \$2.237 trillion, gross private savings is \$1.795 trillion (gross government savings is \$107 billion), so gross savings as a pct of GDP is 13.8%. Of course, most of that is replacement of capital, so net savings (\$247 billion) as a percent of GDP is about 1.9%.

8.1 FOREIGN EXCHANGE MARKET

The **Foreign Exchange Market (Forex, FX, or currency market)** is a form of exchange for the global decentralized trading of international currencies. Financial centers around the world function as anchors of trading between a wide range of different types of buyers and sellers around the clock, with the exception of weekends. EBS and Reuters' dealing 3000 are two main interbank FX trading platforms. The foreign exchange market determines the relative values of different currencies.

The foreign exchange market assists international trade and investment by enabling currency conversion. For example, it permits a business in the United States to import goods from the European Union member states, especially Euro zone members, and pay Euros, even though its income is in United States dollars. It also supports direct speculation in the value of currencies, and the carry trade, speculation based on the interest rate differential between two currencies.

In a typical foreign exchange transaction, a party purchases some quantity of one currency by paying some quantity of another currency. The modern foreign exchange market began forming during the 1970s after three decades of government restrictions on foreign exchange transactions (the Bretton Woods system of monetary management established the rules for commercial and financial relations among the world's major industrial states after World War II), when countries gradually switched to floating exchange rates from the previous exchange rate regime, which remained fixed as per the Bretton Woods system.

The foreign exchange market is unique because of the following characteristics:

- its huge trading volume representing the largest asset class in the world leading to high liquidity;
- its geographical dispersion;
- its continuous operation: 24 hours a day except weekends, i.e., trading from 20:15 GMT on Sunday until 22:00 GMT Friday;
- the variety of factors that affect exchange rates;
- the low margins of relative profit compared with other markets of fixed income; and
- the use of leverage to enhance profit and loss margins and with respect to account size.

Sectors: The Foreign Exchange Market has the following major sectors:

(a) Spot Market,

(b) Forward and Futures Market, and

(c) Currency Options Market.

As such, it has been referred to as the market closest to the ideal of perfect competition, notwithstanding currency intervention by central banks. According to the Bank for International Settlements, as of April

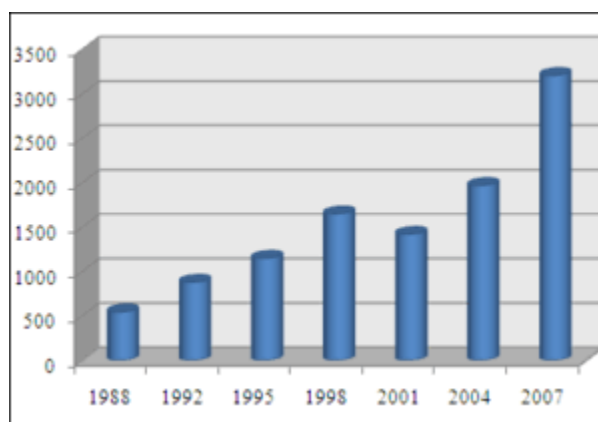


2010, average daily turnover in global foreign exchange markets is estimated at \$3.98 trillion, a growth of approximately 20% over the \$3.21 trillion daily volume as of April 2007. Some firms specializing on foreign exchange market had put the average daily turnover in excess of US\$4 trillion.

The \$3.98 trillion break-down is as follows:

- \$1.490 trillion in spot transactions
- \$475 billion in outright forwards
- \$1.765 trillion in foreign exchange swaps
- \$43 billion currency swaps
- \$207 billion in options and other products

8.1.1 Market Size and Liquidity



Main foreign exchange market turnover, 1988–2007, measured in billions of USD.

The foreign exchange market is the most liquid financial market in the world. Traders include large banks, central banks, institutional investors, currency speculators, corporations, governments, other financial institutions, and retail investors. The average daily turnover in the global foreign exchange and related markets is continuously growing. According to the 2010 Triennial Central Bank Survey, coordinated by the Bank for International Settlements, average daily turnover was US\$3.98 trillion in April 2010 (vs \$1.7 trillion in 1998). Of this \$3.98 trillion, \$1.5 trillion was spot transactions and \$2.5 trillion was traded in outright forwards, swaps and other derivatives.

Trading in the United Kingdom accounted for 36.7% of the total, making it by far the most important centre for foreign exchange trading. Trading in the United States accounted for 17.9%, and Japan accounted for 6.2%.

Turnover of exchange-traded foreign exchange futures and options have grown rapidly in recent years, reaching \$166 billion in April 2010 (double the turnover recorded in April 2007). Exchange-traded currency derivatives represent 4% of OTC foreign exchange turnover. Foreign exchange futures contracts were introduced in 1972 at the Chicago Mercantile Exchange and are actively traded relative to most other futures contracts.

Most developed countries permit the trading of derivative products (like futures and options on futures) on their exchanges. All these developed countries already have fully convertible capital accounts. Some governments of emerging economies do not allow foreign exchange derivative products on their exchanges because they have capital controls. The use of derivatives is growing in many emerging economies. Countries such as Korea, South Africa, and India have established currency futures exchanges, despite having some capital controls.

8.1.2 Functions of the Foreign Exchange Market

The foreign exchange market is merely a part of the money market in the financial centers is a place where foreign moneys are bought and sold. The buyers and sellers of claims on fore' money and the intermediaries together constitute a foreign exchange market. It is not restricted to any given country or a geographical area.

Thus, the foreign exchange market is the market for a national currency (foreign money) anywhere in the world, as the financial centers of the world are united in a single market.

There is a wide variety of dealers in the foreign exchange market. The most important amongst them are the banks. Banks dealing in foreign exchange have branches with substantial balances in different countries. Through their branches and correspondents the services of such banks, usually called 'Exchange Banks', are available all over the world.

These banks discount and sell foreign bills of exchange, issue bank drafts, effect telegraphic transfers and other credit instruments, and discount and collect amounts for such documents. Other dealers in foreign exchange are bill brokers who help sellers and buyers in foreign bills to come together. They are intermediaries and unlike banks are not direct dealers.

Acceptance houses are another class of dealers in foreign exchange. They help foreign remittances by accepting bills on behalf of customers. The central bank and treasury of a country are also dealers in foreign exchange. Both may intervene in the market occasionally. Today, however, those authorities manage exchange rates and implement exchange controls in various ways. In India, however, where there is a strict exchange control system, there is no foreign exchange market as such.

The foreign exchange market performs the following important functions:

- (i) to effect transfer of purchasing power between countries- transfer function;
- (ii) to provide credit for foreign trade - credit function; and
- (iii) to furnish facilities for hedging foreign exchange risks - hedging function.

(i) Transfer Function:

The basic function of the foreign exchange market is to facilitate the conversion of one currency into another, i.e., to accomplish transfers of purchasing power between two countries. This transfer of purchasing power is effected through a variety of credit instruments, such as telegraphic transfers, bank drafts and foreign bills.

In performing the transfer function, the foreign exchange market carries out payments internationally by clearing debts in both directions simultaneously, analogous to domestic clearings.

(ii) Credit Function:

Another function of the foreign exchange market is to provide credit, both national and international, to promote foreign trade. Obviously, when foreign bills of exchange are used in international payments, a credit for about 3 months, till their maturity, is required.

(iii) Hedging Function:

A third function of the foreign exchange market is to hedge foreign exchange risks. In a free exchange market when exchange rates, i.e., the price of one currency in terms of another currency, change, there may be a gain or loss to the party concerned. Under this condition, a person or a firm undertakes a great exchange risk if there are huge amounts of net claims or net liabilities which are to be met in foreign money.

Exchange risk as such should be avoided or reduced. For this the exchange market provides facilities for hedging anticipated or actual claims or liabilities through forward contracts in exchange. A forward contract which is normally for three months is a contract to buy or sell foreign exchange against another currency at some fixed date in the future at a price agreed upon now. No money passes at the time of the contract. But the contract makes it possible to ignore any likely changes in exchange rate.

The existence of a forward market thus makes it possible to hedge an exchange position.



8.1.3 Different Terms Used in a Foreign Exchange Market

1. Exchange Rate	It is the price of one currency quoted in terms of another currency.
2. Spot Rate	It is the exchange rate applicable for an immediate settlement, i.e. the exchange rate prevailing now.
3. Forward Rate	It is the exchange rate contracted today for exchange of currencies at a future date.
4. Direct Quote	It refers to the expression of exchange rate where one unit of foreign currency is expressed in terms of number of units of local / domestic currency. Example \$1 = ₹40.00 [in India]
5. Indirect Quote	It refers to quoting per unit of Local / Domestic Currency in terms of number of units of Foreign Currency. Example: ₹1 = \$0.025.
6. Two Way Quote	Two Way Quote refers to quoting Exchange Rates by an Exchange Dealer in terms of Buying (Bid) Rate and Selling (Ask) Rate.
7. Bid Rate	Bid Rate is the price at which the Exchange Dealer will buy another currency. It is also called as Buy Rate. [It is the rate at which a Customer can sell a Foreign Currency]
8. Offer Rate	Offer Rate is the rate at which the Exchange Dealer will sell currency. It is also called as Sell Rate or Ask Rate. [It is the rate at which a Customer can Buy a Foreign Currency]
9. American Quote	It refers to quoting per unit of any currency in terms of American Dollars.
10. European Quote	It refers to quoting per unit of American Dollars in terms of any other currency.

8.1.4 Top 10 currency traders % of overall volume, May 2013

Rank	Name	Market share
1	 Deutsche Bank	15.18%
2	 Citi	14.90%
3	 Barclays Investment Bank	10.24%
4	 UBS AG	10.11%
5	 HSBC	6.93%
6	 JPMorgan	6.07%
7	 Royal Bank of Scotland	5.62%
8	 Credit Suisse	3.70%
9	 Morgan Stanley	3.15%
10	 Bank of America Merrill Lynch	3.08%

Foreign exchange trading increased by 20% between April 2007 and April 2010 and has more than doubled since 2004. The increase in turnover is due to a number of factors: the growing importance of foreign exchange as an asset class, the increased trading activity of high-frequency traders, and the emergence of retail investors as an important market segment. The growth of electronic execution and

the diverse selection of execution venues has lowered transaction costs, increased market liquidity, and attracted greater participation from many customer types. In particular, electronic trading via online portals has made it easier for retail traders to trade in the foreign exchange market. By 2010, retail trading is estimated to account for up to 10% of spot turnover, or \$150 billion per day.

Foreign exchange is an over-the-counter market where brokers/dealers negotiate directly with one another, so there is no central exchange or clearing house. The biggest geographic trading center is the United Kingdom, primarily London, which according to The City UK estimates has increased its share of global turnover in traditional transactions from 34.6% in April 2007 to 36.7% in April 2010. Due to London's dominance in the market, a particular currency's quoted price is usually the London market price. For instance, when the International Monetary Fund calculates the value of its special drawing rights every day, they use the London market prices at noon that day.

Unlike a stock market, the foreign exchange market is divided into levels of access. At the top is the interbank market, which is made up of the largest commercial banks and securities dealers. Within the interbank market, spreads, which are the difference between the bid and ask prices, are razor sharp and not known to players outside the inner circle. The difference between the bid and ask prices widens (for example from 0 to 1 pip to 1–2 pips for a currencies such as the EUR) as you go down the levels of access. This is due to volume. If a trader can guarantee large numbers of transactions for large amounts, they can demand a smaller difference between the bid and ask price, which is referred to as a better spread. The levels of access that make up the foreign exchange market are determined by the size of the "line" (the amount of money with which they are trading). The top-tier interbank market accounts for 39% of all transactions. From there, smaller banks, followed by large multi-national corporations (which need to hedge risk and pay employees in different countries), large hedge funds, and even some of the retail market makers. According to Galati and Melvin, "Pension funds, insurance companies, mutual funds, and other institutional investors have played an increasingly important role in financial markets in general, and in FX markets in particular, since the early 2000s." (2004) In addition, he notes, "Hedge funds have grown markedly over the 2001–2004 period in terms of both number and overall size". Central banks also participate in the foreign exchange market to align currencies to their economic needs.

The following are the financial market participants :

1. Commercial companies

An important part of this market comes from the financial activities of companies seeking foreign exchange to pay for goods or services. Commercial companies often trade fairly small amounts compared to those of banks or speculators, and their trades often have little short term impact on market rates. Nevertheless, trade flows are an important factor in the long-term direction of a currency's exchange rate. Some multinational companies can have an unpredictable impact when very large positions are covered due to exposures that are not widely known by other market participants.

2. Central banks

National central banks play an important role in the foreign exchange markets. They try to control the money supply, inflation, and/or interest rates and often have official or unofficial target rates for their currencies. They can use their often substantial foreign exchange reserves to stabilize the market. Nevertheless, the effectiveness of central bank "stabilizing speculation" is doubtful because central banks do not go bankrupt if they make large losses, like other traders would, and there is no convincing evidence that they do make a profit trading.

3. Foreign exchange fixing

Foreign exchange fixing is the daily monetary exchange rate fixed by the national bank of each country. The idea is that central banks use the fixing time and exchange rate to evaluate behavior of their currency. Fixing exchange rates reflects the real value of equilibrium in the market. Banks, dealers and traders use fixing rates as a trend indicator.

The mere expectation or rumor of a central bank foreign exchange intervention might be enough to



stabilize a currency, but aggressive intervention might be used several times each year in countries with a dirty float currency regime. Central banks do not always achieve their objectives. The combined resources of the market can easily overwhelm any central bank. Several scenarios of this nature were seen in the 1992–93 European Exchange Rate Mechanism collapse, and in more recent times in Asia.

4. Hedge funds as speculators

About 70% to 90% of the foreign exchange transactions are speculative. In other words, the person or institution that bought or sold the currency has no plan to actually take delivery of the currency in the end; rather, they were solely speculating on the movement of that particular currency. Hedge funds have gained a reputation for aggressive currency speculation since 1996. They control billions of dollars of equity and may borrow billions more, and thus may overwhelm intervention by central banks to support almost any currency, if the economic fundamentals are in the hedge funds' favor.

5. Investment management firms

Investment management firms (who typically manage large accounts on behalf of customers such as pension funds and endowments) use the foreign exchange market to facilitate transactions in foreign securities. For example, an investment manager bearing an international equity portfolio needs to purchase and sell several pairs of foreign currencies to pay for foreign securities purchases.

Some investment management firms also have more speculative specialist currency overlay operations, which manage clients' currency exposures with the aim of generating profits as well as limiting risk. While the number of this type of specialist firms is quite small, many have a large value of assets under management and, hence, can generate large trades.

6. Retail foreign exchange traders

Individual Retail speculative traders constitute a growing segment of this market with the advent of retail foreign exchange platforms, both in size and importance. Currently, they participate indirectly through brokers or banks. Retail brokers, while largely controlled and regulated in the USA by the Commodity Futures Trading Commission and National Futures Association have in the past been subjected to periodic Foreign exchange fraud. To deal with the issue, in 2010 the NFA required its members that deal in the Forex markets to register as such (i.e., Forex CTA instead of a CTA). Those NFA members that would traditionally be subject to minimum net capital requirements, FCMs and IBs, are subject to greater minimum net capital requirements if they deal in Forex. A number of the foreign exchange brokers operate from the UK under Financial Services Authority regulations where foreign exchange trading using margin is part of the wider over-the-counter derivatives trading industry that includes Contract for differences and financial spread betting.

There are two main types of retail FX brokers offering the opportunity for speculative currency trading: brokers and dealers or market makers. Brokers serve as an agent of the customer in the broader FX market, by seeking the best price in the market for a retail order and dealing on behalf of the retail customer. They charge a commission or mark-up in addition to the price obtained in the market. Dealers or market makers, by contrast, typically act as principal in the transaction versus the retail customer, and quote a price they are willing to deal at.

7. Non-bank Foreign Exchange Companies

Non-bank foreign exchange companies offer currency exchange and international payments to private individuals and companies. These are also known as foreign exchange brokers but are distinct in that they do not offer speculative trading but rather currency exchange with payments (i.e., there is usually a physical delivery of currency to a bank account).

It is estimated that in the UK, 14% of currency transfers/payments are made via Foreign Exchange Companies. These companies' selling point is usually that they will offer better exchange rates or cheaper payments than the customer's bank. These companies differ from Money Transfer/Remittance Companies in that they generally offer higher-value services.

8. Money transfer/remittance companies and bureaux de change

Money transfer companies/remittance companies perform high-volume low-value transfers generally by economic migrants back to their home country. In 2007, the Aite Group estimated that there were \$369 billion of remittances (an increase of 8% on the previous year). The four largest markets (India, China, Mexico and the Philippines) receive \$95 billion. The largest and best known provider is Western Union with 345,000 agents globally followed by UAE Exchange

Bureaux de change or currency transfer companies provide low value foreign exchange services for travelers. These are typically located at airports and stations or at tourist locations and allow physical notes to be exchanged from one currency to another. They access the foreign exchange markets via banks or non bank foreign exchange companies.

8.2 FOREIGN EXCHANGE RATE MANAGEMENT

A foreign **exchange rate**, which is also called a forex rate or currency rate, represents the value of a specific currency compared to that of another country. For example, an interbank exchange rate of 91 Japanese yen (JPY, ¥) to the United States dollar (US\$) means that ¥91 will be exchanged for each US\$1 or that US\$1 will be exchanged for each ¥91. Exchange rates are determined in the foreign exchange market, which is open to a wide range of different types of buyers and sellers where currency trading is continuous: 24 hours a day except weekends, i.e. trading from 20:15 GMT on Sunday until 22:00 GMT Friday. The spot exchange rate refers to the current exchange rate. The forward exchange rate refers to an exchange rate that is quoted and traded today but for delivery and payment on a specific future date.

Currency rates are applicable only on currency pairs. The currency listed on the left is called the reference (or base) currency while the one listed to the right is the quote (or term) currency.

Exchange rates are always written in the form of quotations. A quotation reflects the number of quote currencies that can be bought by using a single unit of reference currency.

8.2.1 Foreign Exchange Rates – Determinants

1. **Interest Rate Differentials:** Higher rate of interest for a investment in a particular currency can push up the demand for that currency, which will increase the exchange rate in favour of that currency.
2. **Inflation Rate Differentials:** Different countries' have differing inflation rates, and as a result, purchasing power of one currency will depreciate faster than currency of some other country. This contributes to movement in exchange rate.
3. **Government Policies:** Government may impose restriction on currency transactions. Through RBI, the Government, may also buy or sell currencies in huge quantity to adjust the prevailing exchange rates.
4. **Market Expectations:** Expectations on changes in Government, changes in taxation policies, foreign trade, inflation, etc. contributes to demand for foreign currencies, thereby affecting the exchange rates.
5. **Investment Opportunities:** Increase in investment opportunities in one country leads to influx of foreign currency funds to that country. Such huge inflow will amount to huge supply of that currency, thereby bringing down the exchange rate.
6. **Speculations:** Speculators and Treasury Managers influence movement in exchange rates by buying and selling foreign currencies with expectations of gains by exploiting market inefficiencies. The quantum of their operations affects the exchange rates.



8.2.2 Equilibrium Exchange Rate

Equilibrium Exchange Rate is the one that balances the value of nation's imports and exports. It is based on the flow of goods and services.

Equilibrium Exchange Rate is also called as Trade Approach or Elasticity's Approach to determination of exchange rate.

If the value of the nation's imports exceeds the value of the nation's exports, then domestic currency will depreciate against the importing currency. Import requires payment in Forex and therefore importers will sell home currency to buy foreign currency, pushing up the demand and price of the foreign currency. Since Foreign Currency appreciates, the nation's exports become cheaper to Foreign Countries. Imports become more expensive to domestic residents. This results in increase in exports and fell in imports, until trade is balanced. For above purposes, exchange rate should be market determined & not Government fixed.

The speed of adjustment depends on how responsive or elastic, imports and exports are to Exchange Rate changes. Hence, this approach to exchange rate determination is called Elasticity Approach. If the nation is at or near full employment, a larger depreciation of home currency is essential, to shift domestic resources to the production of more exports. If the nation has huge amount of unemployed resources, then the production should look out for import substitutes, to bring about an realignment in the exchange rates. Govt. policies may be required to reduce domestic expenditure, and to release domestic resources to produce more exports and import substitutes, and thus allow the elasticities approach to operate.

Elasticities Approach stresses on trade and flow of goods and services to determine exchange rate. This theory explains the determination of exchange rate in the long run.

8.2.3 Exchange Rate Agreements (ERAs)

This product was launched by Barclays bank. It is quite similar to Forward Spread Agreement. The ERA seller agrees to receive a 3-9 USD-GBP spread of 177 pips implied by the starting spot, and the 3 and 9 month USD and GBP interest rates. In effect, the ERA seller expects the pound interest rate to fall and/or US interest rate to rise leading to a reduction in the premium on USD (discount on GBP). He agrees to buy GBP 9 months forward at a discount of 177 pips relative to its 3 month rate. At 3 months he will close out by selling GBP 6 months forward at a 6 month spread over spot existing at that time. However, the bet is only on the spread. This can be looked at as follows:

Today, the ERA seller agrees to do the following transactions at 3 months:

Sell GBP spot, buy 6 months forward at a 6-month premium/discount implied by today's 3- and 9-month forward rates.

Buy GBP spot, and sell 6 months forward at the actual premium/discount existing at that time.

Effectively, he will collect the difference between the 3-9 month spread implied by today's interest rates and the 6-month spread that will materialise in the market at the end of 3 months based on the actual USD and GBP rates at that time.

The notional principal is GBP 1 million. If at the end of 3 months the rates are:

USD/GBP spot: 1.4500.

6-month interest rates are 7% and 8% for USD and GBP respectively.

The actual 6-month USD-GBP spread is

$$1.4500 - 1.4500[(1.035/1.04)] = 1.4500 - 1.4430 = 70 \text{ pips.}$$

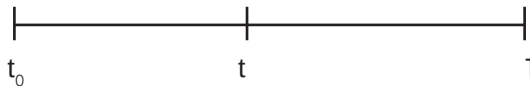
The ERA seller is paid

$$\text{USD}[(0.0177 - 0.0070) * 1 \text{ million} / (1.035)] = \text{USD } 10338.16 = \text{GBP } 7129.77$$

In general, the ERA seller is paid (ERA seller pays if the calculation below leads to a negative result)

$$A = - \left\{ NP \times \frac{(CFS_{t,T} - SFS_{t,T})}{[(1 + r_{t,T}) \times (T - t)]} \right\}$$

The relevant points in time are



t_0 : Current time or “today”.

t, T : Two future dates, $T > t$

NP: Notional principal in base currency.

$CFS_{t,T}$: Contract forward spread from t to T defined as forward rate at time t_0 for delivery at T minus forward rate at time t_0 for delivery at t .

$SFS_{t,T}$: Actual forward spread on settlement date t i.e. the forward rate at time t for delivery at T minus the spot rate at t . (In practice the settlement date may be two days before t).

$r_{t,T}$: Interest rate for quoted currency applicable at time t for horizon T .

The payment is made at time t in the quoted currency.

In the example $CFS_{t,T}$ is -0.0177, $SFS_{t,T}$ is -0.0077, NP is GBP 1million, $(T-t)$ is six months (in practice you must use the actual/360 or actual/365 convention) and $r_{t,T}$ is 7.00%.

By convention, ERA seller is the party which agrees to buy the base currency—sell the quoted currency—at the far end.

Note again that spot rate at time t matters only to the extent that the settlement pips are decided by applying the actual interest differential at time t to the spot rate at time t .

8.2.4 Bid-Ask Rate

The bid price is the highest price that someone is willing to pay at that moment. The stock market is nothing more than an ongoing auction to buy and sell. Just as with any auction, buyers place bids.

The asking price is the lowest price at which someone is willing to sell at that moment. Think of it as when you sell a house or other item, you are “asking” a certain price for it. Sellers place asking prices.

Therefore, if you are interested in buying shares of that stock, you should look at the asking price since that is a seller. You would have a buyer matched with a seller and the trade could be executed.

Likewise, if you are interested in selling your shares, you should look at the bid price since that is a buyer. Again, you'd have a buyer matched with a seller and the trade could get executed.

The bids and offers come from “limit” orders placed by buyers and sellers. For instance, assume ABC stock has a bid of \$50 and an asking price of \$50.30. If you place a limit order to buy 100 shares at \$50.10 that means your order could only get executed if you pay \$50.10 or less. The bid would be raised to \$50.10. The new quote would be bidding \$50.10 and asking \$50.30. You are now the highest bidder and get posted to the board.

Likewise, if someone placed a limit order to sell at \$50.20 that means they will only sell their shares if they can get that price or higher. The new quote would be bid \$50.10 and asking \$50.20. They are now the lowest offer so get posted to the board.

Just remember that the stock market is a continuous auction with buyers and sellers. The bid price shows the highest price someone is willing to pay while the asking price shows the lowest price at which someone will sell.



8.2.5 Spread

Spread is the difference between the dealer's Ask Rate and Bid Rate.

: If the exchange rate is expected to be stable, the spread will be narrow. If the exchange rate is volatile, the spread will be wider.

Where volume of transactions is very high, the Bid-Offer Spread will be very low. In case of a thinly-traded currency, the spread will be wider.

Example: USD ₹40.00 - ₹40.25. Spread is ₹0.25 (Ask Rate **Less** Bid Rate]

Computation of forward Rates of a Currency based on rate of appreciation or depreciation or from swap points

Nature of Appreciation	Forward Rate is Ascertained By
Foreign Currency is appreciating	Multiply the value of home currency by (1+ Appreciation Percentage)
Foreign Currency is depreciating	Multiply the value of home currency by (1 - Depreciation Percentage)
Home Currency is appreciating	Divide the value of home currency by (1 + Appreciation Percentage)
Home Currency is depreciating	Divide the value of home currency by (1 - Depreciation Percentage)

1. Premium / Depreciation in Percentage

Example: In the spot market USD 1 = ₹40, if in the forward market (1 Year) —

If Dollar is appreciating by 10%, then USD 1 = ₹40 X (1 + 10%) = ₹40 X 1.1 = ₹44.00

If Dollar is depreciating by 10%, then USD 1 = ₹40 X (1 - 10%) = ₹40 X 0.9 = ₹36.00

If Rupee is appreciating by 10%, then USD 1 = ₹40 ÷ (1 + 10%) = ₹40 ÷ 1.1 = ₹36.36

If Rupee is depreciating by 10%, then USD 1 = ₹40 ÷ (1 - 10%) = ₹40 ÷ 0.9 = ₹44.44

Note: Home Currency Depreciation Rate ≠ Foreign Currency Appreciation Rate
Home Currency Appreciation Rate ≠ Foreign Currency Depreciation Rate

From Swap Points: Forward Rates are ascertained based on the nature of spread of Swap Points (in case of a Two Way Quote) –

Nature of Spread	Forward Rate is Ascertained By
Spread is Positive (i.e. Swap Points are increasing)	Add the Swap Points to the Spot Rate.
Spread is Negative (i.e. Swap Points are decreasing)	Reduce the Swap Points from the Spot Rate.

Swap Points are movement in Exchange Rate expressed in absolute terms, i.e. in value terms.

Note: Spread = Ask Swap **Less** Bid Swap

Example:

Spot Rate	Swap Points	Forward Bid Rate	Forward Ask Rate
USD 1 = ₹40/₹41	0.50 - 0.60	₹40 + 0.50 = ₹40.50	₹41 + 0.60 = ₹41.60
USD 1 = ₹40 /₹41	0.80 - 0.70	₹40 - 0.80 = ₹39.20	₹41 - 0.70 = ₹40.30

Ascertaining the Appreciation and Depreciation in the case of a Currency

Appreciation:

Currency is said to have appreciated if its value has increased, i.e. an investor is required to pay more for purchasing that currency.

Example: USD 1 = ₹40 becomes USD 1 = ₹42. Here the value of USD has increased. An investor is required to pay more Rupees to acquire one USD.

Premium Quote: A currency is said to be at Premium, if it is appreciating relative to another currency. In the above example, USD is quoted at Premium.

Depreciation:

Currency is said to have depreciated if its value has decreased, i.e. an investor is required to pay less for purchasing that currency.

Example: USD 1 = ₹41 becomes USD 1 = ₹39. Here the value of USD has decreased. An investor is required to pay lesser amount in Rupees to acquire one USD.

Discount Quote: A Currency is said to be quoted at Discount, if it is depreciating relative to another currency. In the above example, USD is quoted at Discount.

Currency at premium or at discount?**Rule for ascertaining whether quoted at Premium / Discount [Based on Forward Rates]:**

Foreign Currency is Expressed	Premium	Discount
Under Direct Quote	Forward Rate > Spot Rate	Forward Rate < Spot Rate
Under Indirect Quote	Forward Rate < Spot Rate	Forward Rate > Spot Rate

Forward Rates are Quoted in Terms of Swap Points:

Foreign Currency is Expressed	Premium	Discount
Under Direct Quote	Swap Points are increasing	Swap Points are Decreasing
Under Indirect Quote	Swap Points are Decreasing	Swap Points are increasing

Computation of Annualized Appreciation / Depreciation:

$$(a) \text{ For Direct Quotes: } \frac{(\text{ForwardRate} - \text{SpotRate})}{\text{SpotRate}} \times 100 \times \frac{12 \text{ Months of 365 Days}}{\text{Period of Quote}}$$

Positive Result = Appreciation in %; Negative Result = Depreciation in %

$$(b) \text{ For Indirect Quotes: } \frac{(\text{SpotRate} - \text{ForwardRate})}{\text{ForwardRate}} \times 100 \times \frac{12 \text{ Months of 365 Days}}{\text{Period of Quote}}$$

Positive Result = Appreciation in %; Negative Result = Depreciation in %

Cross Rate

Cross Rate denotes an exchange rate that does not involve the home currency. It is an exchange rate between the currencies of two countries that are not quoted against each other, but are quoted against one common currency.

Example: From an Indian perspective, USD per GBP, FFr. Per Euro are cross rates.

Benefits: When a Foreign Currency (A) is not traded locally, or no exchange rates are available in terms



of the local currency, but only in terms of some other Foreign Currency (B) and Currency B is traded locally, then Exchange Rate for Currency A can be obtained in terms of Local Currency.

Example: Exchange Rate for Peso is not available in terms of Rupee. However, quote for Peso is available per Euro (Euro 1 = Peso 17.50). Euro is traded in India at ₹57.50. Therefore, Rupee per Unit of Peso can be ascertained as follows —

Rupees/Peso = Rupee/Euro X Euro/Peso

= Rupee/Euro X [1 / (Peso/Euro)]

= ₹57.50 X (1 ÷ Peso 17.50 per Euro) = ₹57.50 x 0.0571 = ₹3.2833 per Peso.

Cross Currency using Two Way Quotes: In case of Two Way Quotes, Exchange Rate between two currencies A and B, using C should be determined as follows —

(a) Bid Rate (A per unit of B) = Bid Rate of A per unit of C X Bid Rate of C per B
= Bid A/C + Bid C/B

(b) Ask Rate (A per unit of B) = Ask Rate of A per unit of C x Ask Rate of C per unit B
= Ask A/C + Ask C/B

Rule for Ascertaining Bid from Ask Rates (Where Currencies are expressed in Direct Quote and Indirect Quote):

(a) Bid Rate (A per Unit of B) = 1 ÷ Ask Rate (B per Unit of A)
= 1 ÷ Ask B/A

(b) Ask Rate (A per Unit of B) = 1 ÷ Bid Rate (B per Unit of A)
= 1 ÷ Bid B/A

Currency Arbitrage

A forex strategy in which a currency trader takes advantage of different spreads offered by brokers for a particular currency pair by making trades. Different spreads for a currency pair imply disparities between the bid and ask prices. Currency arbitrage involves buying and selling currency pairs from different brokers to take advantage of this disparity.

For example, two different banks (Bank A and Bank B) offer quotes for the US/EUR currency pair. Bank A sets the rate at 3/2 dollars per euro, and Bank B sets its rate at 4/3 dollars per euro. In currency arbitrage, the trader would take one euro, convert that into dollars with Bank A and then back into euros with Bank B. The end result is that the trader who started with one euro now has 9/8 euro. The trader has made a 1/8 euro profit if trading fees are not taken into account.

Currency arbitrage involves the exploitation of the differences in quotes rather than movements in the exchange rates of the currencies in the currency pair. Forex traders typically practice two-currency arbitrage, in which the differences between the spreads of two currencies are exploited. Traders can also practice three-currency arbitrage, also known as triangular arbitrage, which is a more complex strategy. Due to the use of computers and high-speed trading systems, large traders often catch differences in currency pair quotes and close the gap quickly.

In today's global economy, a multinational company must deal with currencies of the countries in which it operates. Currency arbitrage, or simultaneous purchase and sale of currencies in different markets, offers opportunities for advantageous movement of money from one currency to another.

For example, converting £1,000 to U.S. Dollars with an exchange rate of \$ 1.60 to £1 will yield \$ 1,600. Another way of making the conversion is to first change the British Pound to Japanese Yen and then convert the Yen to U.S. Dollars using the current exchange rates of £1 = ¥175 and \$1 = ¥ 105. The dollar amount is

$$(\text{£}1,000 \times \text{¥} 175) / \text{¥}105 = \$1,666.67$$

This example demonstrates the advantage of converting British money first to Japanese Yen and then to dollars.

8.2.6 Two Point and Three Point Arbitrage

Exchange rate arbitrage is the practice of taking advantage of inconsistent exchange rates in different markets by selling in one market and simultaneously buying in another. Arbitrageurs do not take risks or, at least, it is not their intention to do so. In other words, they endeavour to maintain closed positions at all times. Rates of profit on arbitrage operations are necessarily low in competitive, well-informed markets, but since transactions are usually very large, absolute profits may also be large from successful arbitrage. Arbitrage performs the function for a market system of bringing prices in one market into line with those in other markets.

There are two types of arbitrage of relevance to forex markets: exchange rate arbitrage and interest rate arbitrage. In exchange rate arbitrage, advantage is taken of differentials in the price of a currency in different markets. Exchange rate arbitrage transactions may be classified in terms of the number of markets involved. Thus, we may have two-point and three-point arbitrage.

8.2.6.1 Two-point arbitrage

Two-point arbitrage concerns two currencies in two geographically separated markets. For example, let the spot exchange rate be $\text{£}1 = \$1.55$ in London and $\text{£}1 = \$1.60$ in New York. Here we are quoting both exchange rates against sterling. That is, we are quoting GBP/USD. This is the indirect quotation of sterling and the direct quotation of the dollar. Remember that the expression Currency A/Currency B gives you the amount of Currency B that exchanges for one unit of currency A. In practice, most exchange rates are quoted against the US dollar. If we were to do this, we would quote:

In London: USD/GBP $\text{£}0.645$

In New York: USD/GBP $\text{£}0.625$.

Thus, in relative terms, sterling is undervalued in London and overvalued in New York. Provided that capital was free to flow between the two centres, arbitrageurs would attempt to exploit, and hence profit from, the differential by selling dollars for pounds in London and reselling the pounds in New York. Assume the arbitrageur sold \$1 million in London. For this, he would have received $\text{£}645,161.29$. Selling this in New York would have returned him $\text{£}1,032,258.06$ - a profit of 5 cents per $\text{£}1$. The sale of dollars in London would have strengthened sterling and pushed the value of the pound above \$1.55. At the same time, the sale of sterling in New York would have caused sterling to weaken there, pushing its value below \$1.60. The action of arbitrageurs would bring the rates of exchange in the two centres together.

In practice, the rates wouldn't come exactly into line because of the existence of transactions costs, but the rates should move to being 'transactions costs close'. There is another simplification in the above example since no regard is paid to the existence of bid and offer rates of exchange. In the real world, the rates may have been something like:

London: GBP/USD Bid 1.5495 Offer 1.5505

New York: GBP/USD Bid 1.5995 Offer 1.6005

Selling dollars in London, the arbitrageur would have been quoted the offer rate of 1.5505 and, thus, would have received $\text{£}644,953.24$. Buying dollars in New York, the arbitrageur would have been quoted the bid rate of 1.5995 and would have received $\text{£}1,031,602.71$. That is, the profits would have been lower because of the bid-offer spread.

8.2.6.2 Three-point (triangular) arbitrage

Exchange rates may be externally consistent but internally inconsistent. That is, exchange rates among different currencies may be mutually inconsistent. Arbitrageurs will then attempt to profit from these



inconsistencies and in the process will eliminate discrepancies and establish mutually consistent cross-exchange rates. A cross-exchange rate is simply the price of a second currency expressed in terms of a third or an exchange rate calculated from two other rates. For example, the rate of the Euro against the Swedish krona derived as the cross rate from US\$ - Krona and US\$ against the Euro.

Consider the following market rates:

USD/CHF (Swiss francs against the US dollar) 1.6639-46 (\$1 = SwFr 1.6639-1.6646)

EUR/USD (US dollar against the Euro) 0.9682-86 (€1 = \$0.9682-0.9686)

Let us use these two exchange rates to calculate the cross-rate of exchange of Swiss francs against the Euro. To do this, we must multiply the same side of each exchange rate. Thus we get:

1.6639 x 0.9682 gives us Bid rate €1 = SwFr 1.6110
1.6646 x 0.9686
gives us Offer rate €1 = Sw Fr 1.6123

That is, we have: EUR/CHF 1.6110-23

If you wish to see how this works, you can work through the various stages. The bid rate is the rate at which the bank bids for Euros. That is, the rate at which the bank buys Euros. Therefore, it applies to the case where a client is selling Euros to the bank in exchange for Swiss dollars. Therefore, start with €1,000,000 and sell them for US dollars. The bank will buy dollars for Euros at a rate of €1 = 0.9682 and the client obtains \$968,200. Then, the client sells dollars for Swiss francs. The bank is now buying dollars and will pay only SwFr1.6639 for each dollar and the client obtains SwFr1,610,988, which gives a rate of exchange of €1 = SwFr1.6110 when rounded to four decimal places.

The offer rate is the rate at which the bank sells (offers) Euros. Therefore, this applies to the case where the client is selling Swiss francs and buying Euros. Now we start with SwFr 1 million and sell them for dollars. The bank will demand SwFr1.6646 for each dollar and so we have \$600,744.92. We then sell them for Euros but the bank now will pay us only €1/0.9686 for each dollar (that is, €1.0324). Therefore, we need to divide \$600,744.92 by 0.9686 and this gives us €620,219.82 and we have an exchange rate of SwFr1 = €0.62022. However, we wish to know how many Swiss francs we can get for one Euro and so we need the reciprocal of this, which is 1.6123.

This particular way of calculating the cross-rate (multiplying the same side of each exchange rate) is needed because we started with one rate in which the dollar was quoted indirectly (USD/CHF) and one where the dollar was quoted directly (EUR/USD). Had we started off with two indirect quotations, the process would have been different. We would have had:

USD/CHF 1.6639-46

USD/EUR 1.0324-28

Then we would have had to cross-divide the two exchange rates:

$1.0328 \div 1.6639 = 0.6207$ and the reciprocal is 1.6110 and

$1.0324 \div 1.6646 = 0.6202$, whose reciprocal is 1.6123.

If both dollar rates had been quoted directly, we would have had:

CHF/USD 0.6007-10

EUR/USD 0.9682-86

We would then have followed the steps:

$0.6007 \div 0.9686 = 0.6202$

$0.6010 \div 0.9682 = 0.6207$

These complications arise because the lower number is always placed first when quoting bid/offer spreads.

In fact, virtually all cross-rates are calculated through the US dollar and the US dollar is normally quoted indirectly.

With all this consideration of cross-rates of exchange, we have rather list sight of three-point arbitrage. In our first, calculation, we finished up with three rates of exchange:

USD/CHF 1.6639-46

EUR/USD 0.9682-86

EUR/CHF 1.6110-23

Suppose now that an inconsistency developed and that the EUR/CHF rate changed to 1.6410-23. That is, in relation to the cross-rate, the Euro was overpriced in terms of Swiss francs. There would be a profit opportunity for arbitrageurs. The question is how one would go about exploiting it (do things the wrong way round and you will make a loss).

It is easy enough to work out the correct procedure. All you need to do is to remember that, to make money, you buy cheap and sell dear. Therefore, you wish always to be selling overpriced products, not buying them. Therefore, to profit in the case above you need to be selling Euros and buying Swiss francs. Then, it depends on which currency you start.

- If you start in dollars, you must sell the dollars for Euros, use the Euros to buy Swiss francs and sell the Swiss francs for dollars.
- If you start in Swiss francs, you need to sell them for dollars, use the dollars to buy Euros and then use the Euros to buy Swiss francs.
- If you start in Euros, you must use the Euros to buy Swiss francs, use the Swiss francs to buy dollars and then use the dollars to buy Euros.

We can check by working out the figures for one of these. Assume we start with \$1 million. We sell dollars and buy Euros at $\text{€}1 = 0.9686$ and this gives us $\text{€}1,032,417.92$. We sell these for Swiss francs at $\text{SwFr}1.6410$, giving us $\text{SwFr}1,694,197.81$. We sell these for dollars at 1.6646 and finish up with \$1,017,780.74. Thus, we have made a profit. You will get the same answer if you start with Euros or Swiss francs and follow the order of the steps above. The crucial point is that you must always, as one of the steps be selling Euros for Swiss francs. Of course, if the market rate were below the cross-rate of exchange, you would need to sell Swiss francs for Euros in order to make a profit.

As with any other arbitrage operation, the sale and purchase of currencies will change the exchange rates until the possibility of profit disappears.

Example : Imagine you are a British arbitrageur, holding sterling, in the following example:

Actual exchange rates

GBB/USD $\text{£}1 = \$ 1.5715-721$ USD/JPY $\$1 = \text{¥} 106.090-120$ GBP/JPY $\text{£}1 = \text{¥} 176.720-831$

Start with $\text{£}1,000,000$.

- (a) List the steps you need to take to make a profit.
- (b) Calculate the rate of profit you will make.

Solution :

Implied cross rates are $\text{£}1 = \text{¥} 166.720-831$. Thus, in the actual market, sterling is overpriced in relation to yen and we must sell sterling for yen.

Thus:

Step A: Use £ to buy yen; Step B: Use yen to buy $\text{\$}$; Step C: Use $\text{\$}$ to buy £



Step B: Sell £ for yen; market-maker sells the foreign currency (¥) at the bid rate of ¥176.720. This gives ¥176,720,000.

Step C: Sell ¥ for \$; market-maker sells dollars at the offer rate of ¥106.120. This gives \$1,665,284.58

Step D: Sell \$ for £. The market-maker buys dollars at the higher rate of \$1.5721, which gives £1,059,273.95 or a profit of 5.9%.

This is, of course, a ridiculously high rate of profit, since it could be made in a matter of moments. In practice, rates only have to get slightly out of line before the arbitrageurs step in.

8.3 PARITY CONDITIONS IN INTERNATIONAL FINANCE

Managers of multinational firms, international investors, importers and exporters, and government officials must deal with these fundamental issues:

- Are changes in exchange rates predictable?
- How are exchange rates related to interest rates?
- What, at least theoretically, is the “proper” exchange rate?

To answer these questions we need to first understand the economic fundamentals of international finance, known as parity conditions.

Parity Conditions provide an intuitive explanation of the movement of prices and interest rates in different markets in relation to exchange rates.

The derivation of these conditions requires the assumption of Perfect Capital Markets (PCM).

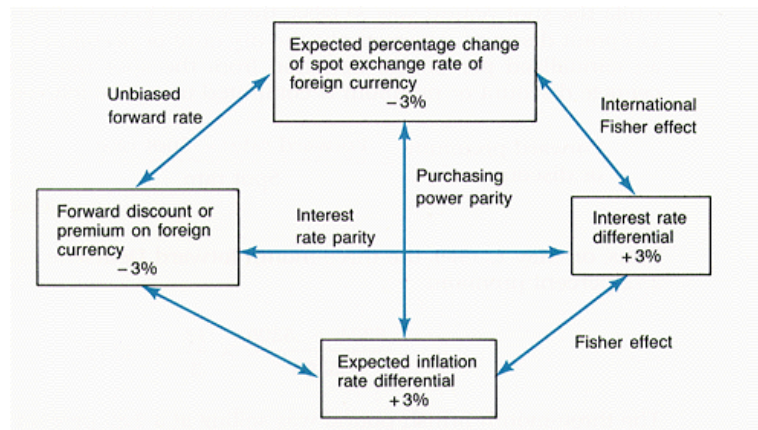
- no transaction costs
- no taxes
- complete certainty

Note – Parity Conditions are expected to hold in the long-run, but not always in the short term.

We shall now examine a simple yet elegant set of equilibrium (or parity) conditions that should apply to product prices, interest rates, and spot and forward exchange rates if the markets are not impeded. These parity conditions provide the foundation for much of the theory and practice of international finance.

In competitive markets, characterized by numerous buyers and sellers having low-cost access to information, exchange-adjusted prices of identical tradeable goods and financial assets must be within transactions costs of equality worldwide. This idea, referred to as the **law of one price**, is enforced by international arbitrageurs who follow the profit-guaranteeing dictum of “buy low, sell high” and prevent all but trivial deviations from equality. Similarly, in the absence of market imperfections, risk-adjusted expected returns on financial assets in different markets should be equal.

Five key theoretical economic relationships, which are depicted in the following figure, result from these arbitrage activities. This framework emphasizes the links among prices, spot exchange rates, interest rates, and forward exchange rates. According to the diagram, if inflation in, say, France is expected to exceed inflation in the United States by 3 percent for the coming year, then the French franc should decline in value by about 3 percent relative to the dollar. By the same token, the one-year forward French franc should sell at a 3 percent discount relative to the U.S. dollar. Similarly, one-year interest rates in France should be about 3 percent higher than one-year interest rates on securities of comparable risk in the United States.



8.3.1 Purchasing Power Parity Theory

The first original reference of PPP Theory was made by David Ricardo. However, Gustav Cassel popularized this theory in 1918. According to PPP theory, when exchange rates are of a fluctuating nature, the rate of exchange between two currencies in the long run will be fixed by their respective purchasing powers in their own nations.

Foreign currency is demanded by the people because it has some purchasing power in its own nation. Also domestic currency has a certain purchasing power, because it can buy some amount of goods/ services in the domestic economy. Thus, when home currency is exchanged for any foreign currency, in fact the domestic purchasing is being exchanged for the purchasing power, because it can buy some amount of goods/ services in the domestic economy. Thus, when home currency is exchanged for any foreign currency, in fact the domestic purchasing power is being exchanged for the purchasing power of that foreign currency. This exchange of the purchasing power takes place at some specified rate where purchasing of two currencies nations gets equalized. Thus, the relative purchasing power of the two currencies determines the exchange rate. The exchange rate under this theory is in equilibrium when their domestic purchasing powers at that rate of exchanges are equivalent e.g., Suppose certain bundle of goods/ services in U.S.A. costs U.S. \$ 10 and the same bundle in India costs, Rs. 450/- then the exchange rate between Indian Rupee and U.S. Dollar is \$1 = Rs. 45. Because this is the exchange rate at which the parity between the purchasing power of two nations is maintained. A change in the purchasing power of any currency will reflect in the exchange rates also. Hence under this theory the external value of the currency depends on the domestic purchasing power of that currency relative to that of another currency.

In short, what this means is that a bundle of goods should cost the same in Canada and the United States once you take the exchange rate into account. To see why, we'll use an example.

8.3.1.1 Purchasing Power Parity and Baseball Bats

First suppose that one U.S. Dollar (USD) is currently selling for ten Mexican Pesos (MXN) on the exchange rate market. In the United States wooden baseball bats sell for \$40 while in Mexico they sell for 150 pesos. Since 1 USD = 10 MXN, then the bat costs \$40 USD if we buy it in the U.S. but only 15 USD if we buy it in Mexico. Clearly there's an advantage to buying the bat in Mexico, so consumers are much better off going to Mexico to buy their bats. If consumers decide to do this, we should expect to see three things happen:

1. American consumers desire Mexico Pesos in order to buy baseball bats in Mexico. So they go to an exchange rate office and sell their American Dollars and buy Mexican Pesos. This will cause the Mexican Peso to become more valuable relative to the U.S. Dollar.
2. The demand for baseball bats sold in the United States decreases, so the price American retailers charge goes down.



3. The demand for baseball bats sold in Mexico increases, so the price Mexican retailers charge goes up.

Eventually these three factors should cause the exchange rates and the prices in the two countries to change such that we have purchasing power parity. If the U.S. Dollar declines in value to 1 USD = 8 MXN, the price of baseball bats in the United States goes down to \$30 each and the price of baseball bats in Mexico goes up to 240 pesos each, we will have purchasing power parity. This is because a consumer can spend \$30 in the United States for a baseball bat, or he can take his \$30, exchange it for 240 pesos (since 1 USD = 8 MXN) and buy a baseball bat in Mexico and be no better off.

8.3.1.2 Purchasing Power Parity and the Long Run

Purchasing-power parity theory tells us that price differentials between countries are not sustainable in the long run as market forces will equalize prices between countries and change exchange rates in doing so. You might think that my example of consumers crossing the border to buy baseball bats is unrealistic as the expense of the longer trip would wipe out any savings you get from buying the bat for a lower price. However it is not unrealistic to imagine an individual or company buying hundreds or thousands of the bats in Mexico then shipping them to the United States for sale. It is also not unrealistic to imagine a store like Walmart purchasing bats from the lower cost manufacturer in Mexico instead of the higher cost manufacturer in Mexico. In the long run having different prices in the United States and Mexico is not sustainable because an individual or company will be able to gain an arbitrage profit by buying the good cheaply in one market and selling it for a higher price in the other market.

Since the price for any one good should be equal across markets, the price for any combination or basket of goods should be equalized.

Mathematical Equation:

Exchange Rate Differential = Inflation Rate Differential

$$\Rightarrow \frac{\text{forwardRate}}{\text{SpotRate}} = \frac{(\text{1} + \text{InterestRate in Home Country})}{(\text{1} + \text{InterestRate in Foreign Country})}$$

$$\Rightarrow \text{Forward Rate} = \text{Spot Rate} \times \frac{(\text{1} + \text{InterestRate in Home Country})}{(\text{1} + \text{InterestRate in Foreign Country})}$$

Inferences Drawn out of Interest Rate Differentials: If Home Country Inflation Rate is –

Greater than Foreign Country Inflation Rate	Lower than Foreign Country Inflation Rate
Foreign Currency should be traded at Premium	Foreign Currency should be traded at Discount.

8.3.1.3 Criticism of Purchasing Power Parity (PPP) Theory

1. **Limitations of the Price Index** : As seen above in the relative version the PPP theory uses the price index in order to measure the changes in the equilibrium rate of exchange. However, price indices suffer from various limitations and thus theory too.
2. **Neglect of the demand / supply Approach** : The theory fails to explain the demand for as well as the supply of foreign exchange. The PPP theory proves to be unsatisfactory due to this negligence. Because in actual practice the exchange rate is determined according to the market forces such as the demand for and supply of foreign currency.
3. **Unrealistic Approach** : Since the PPP theory uses price indices which itself proves to be unrealistic. The reason for this is that the quality of goods and services included in the indices differs from nation to nation. Thus, any comparison without due significance for the quality proves to be unrealistic.

4. **Unrealistic Assumptions** : It is yet another valid criticism that the PPP theory is based on the unrealistic assumptions such as absence of transport cost. Also it wrongly assumes that there is an absence of any barriers to the international trade.
5. **Neglects Impact of International Capital Flow** : The PPP theory neglects the impact of the international capital movements on the foreign exchange market. International capital flows may cause fluctuations in the existing exchange rate.
6. **Rare Occurrence** : According to critics, the PPP theory is in contrast to the Practical approach. Because, the rate of exchange between any two currencies based on the domestic price ratios is a very rare occurrence.

Despite these criticisms the theory focuses on the following major Points.

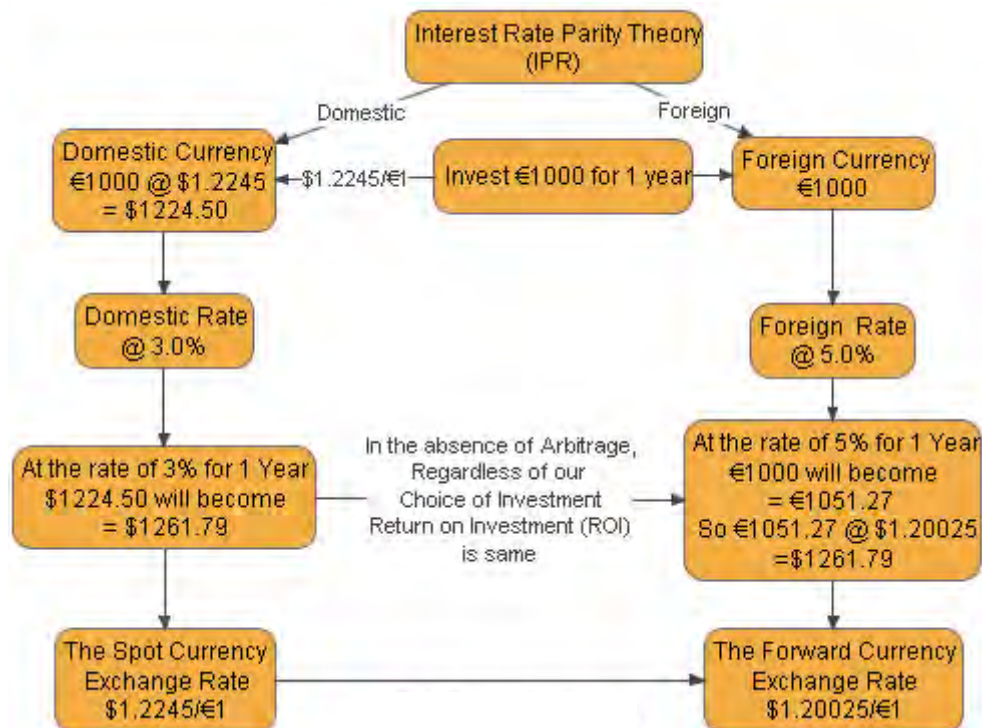
1. It tries to establish relationship between domestic price level and the exchange rates.
2. The theory explains the nature of trade as well as considers the BOP (Balance of Payments) of a nation.

8.3.2 Interest Rate Parity

Interest Rate Parity (IPR) theory is used to analyze the relationship between at the spot rate and a corresponding forward (future) rate of currencies.

The IPR theory states interest rate differentials between two different currencies will be reflected in the premium or discount for the forward exchange rate on the foreign currency if there is **no arbitrage** - the activity of buying shares or currency in one financial market and selling it at a profit in another.

The theory further states size of the forward premium or discount on a foreign currency should be equal to the interest rate differentials between the countries in comparison.





Examples

For our illustration purpose consider investing € 1000 for 1 year.

We'll consider two investment cases viz:

Case I: Domestic Investment

In the U.S.A., consider the spot exchange rate of \$1.2245/€ 1.

So we can exchange our € 1000 @ \$1.2245 = \$1224.50

Now we can invest \$1224.50 @ 3.0% for 1 year which yields **\$1261.79** at the end of the year.

Case II: Foreign Investment

Likewise we can invest € 1000 in a foreign European market, say at the rate of 5.0% for 1 year.

But we buy forward 1 year to lock in the future exchange rate at

\$1.20025/€ 1 since we need to convert our € 1000 back to the domestic currency, i.e. the U.S. Dollar.

So € 1000 @ of 5.0% for 1 year = € 1051.27

Then we can convert € 1051.27 @ \$1.20025 = **\$1261.79**

Thus, in the absence of **arbitrage**, the Return on Investment (ROI) is same regardless of our choice of investment method.

Mathematical Equation:

Exchange Rate Differential = Interest Rate Differential

$$\Rightarrow \frac{\text{Forward Rate}}{\text{Spot Rate}} = \frac{(1 + \text{Interest Rate in Home Country})}{(1 + \text{Interest Rate in Foreign Country})}$$

$$\Rightarrow \text{Forward Rate} = \text{Spot rate} \times \frac{(1 + \text{Interest Rate in Home Country})}{(1 + \text{Interest Rate in Foreign Country})}$$

Inference Drawn out of Interest Rate Differentials: If Home Currency Interest Rate is -

Greater than Foreign Currency Interest Rate	Lower than Foreign Currency Interest Rate
Foreign Currency should be traded at Premium	Foreign Currency should be traded at Discount.

8.3.2.1 Types of Interest Rate Parity

There are two types of IRP :

1. Covered Interest Rate Parity (CIRP)

Covered Interest Rate theory states that exchange rate forward premiums (discounts) offset interest rate differentials between two sovereigns.

In another words, covered interest rate theory holds that interest rate differentials between two countries are offset by the spot/forward currency premiums as otherwise investors could earn a pure arbitrage profit.

Covered Interest Rate Examples

Assume Google Inc., the U.S. based multi-national company, needs to pay it's European employees in Euro in a month's time.

Google Inc. can achieve this in several ways viz:

- Buy Euro forward 30 days to lock in the exchange rate. Then Google can invest in dollars for 30 days until it must convert dollars to Euro in a month. This is called covering because now Google Inc. has no exchange rate fluctuation risk.
- Convert dollars to Euro today at spot exchange rate. Invest Euro in a European bond (in Euro) for 30 days (equivalently loan out Euro for 30 days) then pay it's obligation in Euro at the end of the month.

Under this model Google Inc. is sure of the interest rate that it will earn, so it may convert fewer dollars to Euro today as it's Euro will grow via interest earned.

This is also called covering because by converting dollars to Euro at the spot, the risk of exchange rate fluctuation is eliminated.

2. Uncovered Interest Rate Parity (UIP)

Uncovered Interest Rate theory states that expected appreciation (depreciation) of a currency is offset by lower (higher) interest.

Uncovered Interest Rate Example

In the above example of covered interest rate, the other method that Google Inc. can implement is:

- Google Inc. can also invest the money in dollars today and change it for Euro at the end of the month.

This method is uncovered because the exchange rate risks persist in this transaction.

Covered Interest Rate Vs. Uncovered Interest Rate

Recent empirical research has identified that uncovered interest rate parity does not hold, although violations are not as large as previously thought and seems to be currency rather than time horizon dependent.

In contrast, covered interest rate parity is well established in recent decades amongst the OECD economies for short-term instruments. Any apparent deviations are credited to transaction costs.

8.3.2.2 Implications of Interest Rate Parity Theory

If IRP theory holds then arbitrage is not possible. No matter whether an investor invests in domestic country or foreign country, the rate of return will be the same as if an investor invested in the home country when measured in domestic currency.

If domestic interest rates are less than foreign interest rates, foreign currency must trade at a forward discount to offset any benefit of higher interest rates in foreign country to prevent arbitrage.

If foreign currency does not trade at a forward discount or if the forward discount is not large enough to offset the interest rate advantage of foreign country, arbitrage opportunity exists for domestic investors. So domestic investors can benefit by investing in the foreign market.

If domestic interest rates are more than foreign interest rates, foreign currency must trade at a forward premium to offset any benefit of higher interest rates in domestic country to prevent arbitrage.

If foreign currency does not trade at a forward premium or if the forward premium is not large enough to offset the interest rate advantage of domestic country, arbitrage opportunity exists for foreign investors. So foreign investors can benefit by investing in the domestic market.

8.3.2.3 Limitations of Interest Rate Parity Model

In recent years the interest rate parity model has shown little proof of working.

In many cases, countries with higher interest rates often experience it's currency appreciate due to higher demands and higher yields and has nothing to do with risk-less arbitrage.



8.3.3 Fisher Effect

Interest rates and inflation are objects of financial fascination around the world. The Fisher effect is a theory about the relationship between the two, basically stating that when one rises, so does the other.

The **Fisher Effect** is an economic hypothesis stating that the real interest rate is equal to the nominal rate minus the expected rate of inflation. It states that, in response to a change in the money supply, the nominal interest rate changes in tandem with changes in the inflation rate in the long run. For example, if monetary policy were to cause inflation to increase by 5 percentage points, the nominal interest rate in the economy would eventually also increase by 5 percentage points.

In order to understand the Fisher effect, it's crucial to understand the concepts of nominal and real interest rates.

In the late 1930s, U.S. economist Irving Fisher wrote a paper which posited that a country's interest rate level rises and falls in direct relation to its inflation rates. Fisher mathematically expressed this theory in the following way:

R Nominal = R Real + R Inflation

The equation states that a country's current (nominal) interest rate is equal to a real interest rate adjusted for the rate of inflation. In this sense, Fisher conceived of interest rates, as the prices of lending, being adjusted for inflation in the same manner that prices of goods and services are adjusted for inflation. For instance, if a country's nominal interest rate is six percent and its inflation rate is two percent, the country's real interest rate is four percent ($6\% - 2\% = 4\%$).

In simple terms: an increase in inflation will result in an increase in the nominal interest rate. For example, if the real interest rate is held at a constant 5.5% and inflation increased from 2% to 3%, the Fisher Effect indicates that the nominal interest rate would have to increase from 7.5% (5.5% real rate + 2% inflation rate) to 8.5% (5.5% real rate + 3% inflation rate).

The *Fisher effect* is an important tool by which lenders can gauge whether or not they are making money on a granted loan. Unless the rate charged is above and beyond the economy's inflation rate, a lender will not profit from the interest. Moreover, according to Fisher's theory, even if a loan is granted at no interest, a lending party would need to charge at least the inflation rate in order to retain purchasing power upon repayment.

8.3.3.1 International Fisher Effect

In foreign exchange terminology, the International Fisher Effect is based on the idea that a country with a higher interest rate will have a higher rate of inflation which, in turn, could cause its currency to depreciate. In theoretical terms, this relationship is expressed as an equality between the expected percentage exchange rate change and the difference between the two countries' interest rates, divided by one plus the second country's interest rate. Because the divisor approximates 1, the expected percent exchange rate change roughly equals the interest rate differential.

It is based on present and future risk-free nominal interest rates rather than pure inflation, and is used to predict and understand present and future spot currency price movements. In order for this model to work in its purest form, it is assumed that the risk-free aspects of capital must be allowed to free flow between nations that comprise a particular currency pair.

International Fisher Effect Example:

Putting the International Fisher Effect or IFE into practice would mean that exchange rates change based on nominal interest rate differentials and independent of inflation rates. An example of using the IFE to forecast exchange rate shifts would be if the U.S. nominal interest rate was at 1%, but the Australian rate was at 3%, then the Aussie would be expected to rise by 2% against the U.S. Dollar.

8.3.3.2 Fisher Effect Background

The decision to use a pure interest rate model rather than an inflation model or some combination stems from the assumption by Fisher that real interest rates are not affected by changes in expected inflation rates because both will become equalized over time through market arbitrage; inflation is embedded within the interest rate and factored into market projections for a currency price. It is assumed that spot currency prices will naturally achieve parity with perfect ordering markets. This is known as the Fisher Effect and not to be confused with the International Fisher Effect.

Fisher believed the pure interest rate model was more of a leading indicator that predicts future spot currency prices 12 months in the future. The minor problem with this assumption is that we can't ever know with certainty over time the spot price or the exact interest rate. This is known as uncovered interest parity. The question for modern studies is: does the International Fisher Effect work now that currencies are allowed to free float. From the 1930s to the 1970s we didn't have an answer because nations controlled their currency price for economic and trade purposes. This begs the question: has credence been given to a model that hasn't really been fully tested? Yet the vast majority of studies only concentrated on one nation and compared that nation to the United States currency.

8.3.3.3 The Fisher Effect Vs. The IFE

The Fisher Effect model says nominal interest rates reflect the real rate of return and expected rate of inflation. So the difference between real and nominal rates of interest is determined by expected rates of inflation. The approximate nominal rate of return = real rate of return plus the expected rate of inflation. For example, if the real rate of return is 3.5% and expected inflation is 5.4 % then the approximate nominal rate of return is $0.035 + 0.054 = 0.089$ or 8.9%. The precise formula is $(1 + \text{nominal rate}) = (1 + \text{real rate}) \times (1 + \text{inflation rate})$, which would equal 9.1% in this example. The IFE takes this example one step further to assume appreciation or depreciation of currency prices is proportionally related to differences in nominal rates of interest. Nominal interest rates would automatically reflect differences in inflation by a purchasing power parity or no-arbitrage system.

8.3.3.4 The IFE in Action

For example, suppose the GBP/USD spot exchange rate is 1.5339 and the current interest rate in the U.S. is 5% and 7% in Great Britain. The IFE predicts that the country with the higher nominal interest rate (GBP in this case) will see its currency depreciate. The expected future spot rate is calculated by multiplying the spot rate by a ratio of the foreign interest rate to domestic interest rate: $(1.5339 \times (1.07/1.05)) = 1.5631$. The IFE expects the GBP/USD to appreciate to 1.5631 and the USD/GBP to depreciate to 0.6398 so that investors in either currency will achieve the same average return i.e. an investor in USD will earn a lower interest rate of 5% but will also gain from appreciation of the USD.

For the shorter term, the IFE is generally unreliable because of the numerous short-term factors that affect exchange rates and the predictions of nominal rates and inflation. Longer-term International Fisher Effects have proven a bit better, but not by very much. Exchange rates eventually offset interest rate differentials, but prediction errors often occur. Remember that we are trying to predict the spot rate in the future. IFE fails particularly when the costs of borrowing or expected returns differ, or when purchasing power parity fails. This is defined when the cost of goods can't be exchanged in each nation on a one-for-one basis after adjusting for exchange rate changes and inflation.

Today, we don't normally see the big interest rate changes we have seen in the past. One point or even half point nominal interest rate changes rarely occur. Instead, the focus for central bankers in the modern day is not an interest rate target, but rather an inflation target where interest rates are determined by the expected rate of inflation. Central bankers focus on their nation's Consumer Price Index (CPI) to measure prices and adjust interest rates according to prices in an economy. To do otherwise may cause an economy to fall into deflation or stop a growing economy from further growth. The Fisher models may not be practical to implement in your daily currency trades, but their usefulness lies in their ability to illustrate the expected relationship between interest rates, inflation and exchange rates.



8.3.4 Arbitrage Operations

Business operation involving the purchase of foreign exchange, gold, financial securities, or commodities in one market and their almost simultaneous sale in another market, in order to profit from price differentials existing between the markets. Opportunities for arbitrage may keep recurring because of the working of market forces. Arbitrage generally tends to eliminate price differentials between markets. Whereas in less developed countries arbitrage can consist of the buying and selling of commodities in different villages within the country, in highly developed countries the term is generally used to refer to international operations involving foreign-exchange rates, short-term interest rates, prices of gold, and prices of securities.

Foreign-exchange arbitrage, confined to spot-exchange markets—in which exchange is bought and sold for immediate delivery—may involve two or more exchange centres (two-point arbitrage or multiple-point arbitrage). For example, assume that Country A's sovereign is exchanging at two to the dollar in New York City, while Country B's franc is valued at five to the dollar. Logically, Country A's sovereign should exchange at two sovereigns to five francs. But for some reason banks in Country B are paying four francs for two sovereigns. A New York City operator with \$100,000 at his disposal may then make three moves: (1) buy 500,000 francs in New York City in the form of an electronic transfer to his account in Country B; (2) instruct his correspondent in Country B to use a similar amount of francs to buy 250,000 of Country A's sovereigns at the going rate of four francs for two sovereigns, in the form of an electronic transfer to his account in Country A; and (3) sell the same amount of sovereigns in New York City at two to the dollar for a total of \$125,000, or a profit of \$25,000. Foreign exchange operators will continue to do this until the heavy demand for francs in New York City has raised their price and eliminated the profit.

Opportunities for interest arbitrage arise when the money rates differ among countries. Gold arbitrage and securities arbitrage operate in principle very much like commodity arbitrage in the domestic market, except that in the two former cases exchange rates are important, either because funds must be remitted abroad for the operation or because the proceeds must be brought home at the end of the operation.

With the increase in corporate mergers and takeovers in the 1980s, a form of stock speculation called risk arbitrage arose. It was based on the fact that a company or corporate raider, when trying to merge with or purchase a corporation, usually must offer to buy that company's stock at a price 30 or 40 percent higher than the current market price, and the target company's price usually rises to near the offered price on the open market once the takeover attempt has been publicly announced. Risk arbitrageurs try to identify in advance those companies that are targeted for a takeover; they then buy blocks of the company's stock before a tender offer has been announced and sell that stock after the merger or takeover has been completed, thus realizing large profits. The risk is that the merger or takeover attempt will not succeed, in which case the stock price usually falls back down again, thus incurring large losses for the arbitrageur.

Risk arbitrageurs' activities can either facilitate or hinder the efforts of corporate raiders and investment banks to consummate a takeover attempt, and there are temptations for those parties to communicate advance knowledge of their takeover attempts to arbitrageurs, who can then speculate in the target company's stock with a minimum of risk. This is a form of insider trading and is illegal in the United States and some other countries. Such was the case with the best known American arbitrageur, Ivan Boesky, who, while under government investigation in 1986, admitted that he had engaged in some highly profitable insider trading and was fined \$100,000,000 as a consequence.

8.3.4.1 Covered Interest Arbitrage

An arbitrage transaction that takes advantage of any instance when the forward premium or forward discount between two currencies does not equal the interest rate differential. When this occurs, arbitrageurs can use covered interest arbitrage to generate profits until the relationships return to equilibrium. This may be done by buying one currency in the spot market and simultaneously selling it in the forward market and using the spot proceeds to invest in an asset denominated in the spot

currency; when the asset matures, the proceeds are used to fulfill the forward contract and the arbitrage transaction concludes with a riskfree profit.

Steps in Covered Interest Arbitrage:

- (a) Identify Future Spot Price based on Interest Rate Parity Theory.
- (b) Compare Future Spot Price with Forward Rate available for the period.
- (c) If Future Spot Price > Forward Rate, i.e. Forward Rate is Undervalued, **Buy Forward. Sell Spot.**

Action	Time	Activity
Borrow	Now	Borrow in Foreign Currency at its Borrowing Rate.
Contract	Now	Enter into Forward Contract for buying Foreign Currency at the maturity date.
Convert	Now	Sell Foreign Currency at Spot Rate and realize the proceeds in Home Currency.
Invest	Now	Invest the Home Currency available in Home Currency Deposits.
Realize	Maturity	Realize the maturity value of Home Currency Deposits.
Honour	Maturity	Honour the Forward Contract for buying Foreign Currency at Forward Rates using the Home Currency Deposit proceeds.
Repay	Maturity	Repay the Foreign Currency Liability using the Foreign Currency bought.
Gain	Maturity	Foreign Currency Bought Less Foreign Currency Settled.

Action	Time	Activity
Borrow	Now	Borrow in Home Currency at its Borrowing Rate.
Contract	Now	Enter into Forward Contract for selling Foreign Currency at the Maturity date.
Convert	Now	Buy Foreign Currency at Spot Rate, using the amount borrowed.
Invest	Now	Invest the Foreign Currency available in Foreign Currency Deposits.
Realize	Maturity	Realize the maturity value of Foreign Currency Deposits.
Honour	Maturity	Honour the Forward Contract for selling the maturity proceeds of Foreign Currency Deposits at Forward Contract Rates to realize Home Currency.
Repay	Maturity	Repay the Home Currency Liability using the proceeds of Forward Sale.
Gain	Maturity	Home Currency Proceeds on Forward Contract Sale Less Home Currency Liability Paid including interest.

- (d) If Future Spot Price < Forward Rate i.e. Forward Rate is Overvalued. **Sell Forward. Buy Spot.**

8.4 EXCHANGE RATE RISK MANAGEMENT

Foreign exchange risk is the level of uncertainty that a company must manage for changes in foreign exchange rates, that will adversely affect the money the company receives for goods and services over a period of time.

For example, a company sells goods to a foreign company. They ship the goods today, but will not receive payment for several days, weeks or months. During this grace period, the exchange rates fluctuate. At the time of settlement, when the foreign company pays the domestic company for the goods, the rates may have traveled to a level that is less than what the company contemplated. As a result, the company may suffer a loss or the profits may erode.



To minimize or manage the risk, companies enter into contracts to buy foreign currency at a specified rate. This allows the companies to minimize the uncertainty of the risk, so that they can price their products accordingly.

A common definition of exchange rate risk relates to the effect of unexpected exchange rate changes on the value of the firm (Madura, 1989). In particular, it is defined as the possible direct loss (as a result of an unhedged exposure) or indirect loss in the firm's cash flows, assets and liabilities, net profit and, in turn, its stock market value from an exchange rate move. To manage the exchange rate risk inherent in every multinational firm's operations, a firm needs to determine the specific type of current risk exposure, the hedging strategy and the available instruments to deal with these currency risks.

Multinational firms are participants in currency markets by virtue of their international transactions. To measure the impact of exchange rate movements on a firm that is involved in foreign-currency denominated operations, i.e., the implied value-at-risk (VaR) from exchange rate moves, we need to identify the type of risks that the firm is exposed to and the amount of risk encountered (Hakala and Wystup, 2002).

8.4.1 Types of Exchange Rate Risk

The three main types of exchange rate risk are

1. **Transaction risk**, which is basically cash flow risk and deals with the effect of exchange rate moves on transactional account exposure related to receivables (export contracts), payables (import contracts) or repatriation of dividends. An exchange rate change in the currency of denomination of any such contract will result in a direct transaction exchange rate risk to the firm;
2. **Translation risk**, which is basically balance sheet exchange rate risk and relates exchange rate moves to the valuation of a foreign subsidiary and, in turn, to the consolidation of a foreign subsidiary to the parent company's balance sheet. Translation risk for a foreign subsidiary is usually measured by the exposure of net assets (assets less liabilities) to potential exchange rate moves. In consolidating financial statements, the translation could be done either at the end-of-the-period exchange rate or at the average exchange rate of the period, depending on the accounting regulations affecting the parent company. Thus, while income statements are usually translated at the average exchange rate over the period, balance sheet exposures of foreign subsidiaries are often translated at the prevailing current exchange rate at the time of consolidation; and
3. **Economic risk**, which reflects basically the risk to the firm's present value of future operating cash flows from exchange rate movements. In essence, economic risk concerns the effect of exchange rate changes on revenues (domestic sales and exports) and operating expenses (cost of domestic inputs and imports). Economic risk is usually applied to the present value of future cash flow operations of a firm's parent company and foreign subsidiaries. Identification of the various types of currency risk, along with their measurement, is essential to develop a strategy for managing currency risk

8.4.2 Measurement of Exchange Rate Risk

After defining the types of exchange rate risk that a firm is exposed to, a crucial aspect of a firm's exchange rate risk management decisions is the measurement of these risks. Measuring currency risk may prove difficult, at least with regards to translation and economic risk (Van Deventer, Imai, and Mesler, 2004; Holton, 2003). At present, a widely-used method is the value-at-risk (VaR) model. Broadly, value at risk is defined as the maximum loss for a given exposure over a given time horizon with $z\%$ confidence.

The VaR methodology can be used to measure a variety of types of risk, helping firms in their risk management. However, the VaR does not define what happens to the exposure for the $(100 - z)\%$ point of confidence, i.e., the worst case scenario.

Since the VaR model does not define the maximum loss with 100% confidence, firms often set operational limits, such as nominal amounts or stop loss orders, in addition to VaR limits, to reach the highest possible coverage

Value-at-Risk calculation

The VaR measure of exchange rate risk is used by firms to estimate the riskiness of a foreign exchange position resulting from a firm's activities, including the foreign exchange position of its treasury, over a certain time period under normal conditions (Holton, 2003). The VaR calculation depends on 3 parameters:

- The holding period, i.e., the length of time over which the foreign exchange position is planned to be held. The typical holding period is 1 day.
- The confidence level at which the estimate is planned to be made. The usual confidence levels are 99% and 95%.
- The unit of currency to be used for the denomination of the VaR.

Assuming a holding period of x days and a confidence level of $y\%$, the VaR measures what will be the maximum loss (i.e., the decrease in the market value of a foreign exchange position) over x days, if the x -days period is not one of the $(100-y)\%$ x -days periods that are the worst under normal conditions. Thus, if the foreign exchange position has a 1-day VaR of \$10 million at the 99% confidence level, the firm should expect that, with a probability of 99%, the value of this position will decrease by no more than \$10 million during 1 day, provided that usual conditions will prevail over that 1 day. In other words, the firm should expect that the value of its foreign exchange rate position will decrease by no more than \$10 million on 99 out of 100 usual trading days, or by more than \$10 million on 1 out of every 100 usual trading days.

To calculate the VaR, there exists a variety of models. Among them, the more widely-used are: (1) the historical simulation, which assumes that currency returns on a firm's foreign exchange position will have the same distribution as they had in the past; (2) the variance-covariance model, which assumes that currency returns on a firm's total foreign exchange position are always (jointly) normally distributed and that the change in the value of the foreign exchange position is linearly dependent on all currency returns; and (3) Monte Carlo simulation, which assumes that future currency returns will be randomly distributed.

The historical simulation is the simplest method of calculation. This involves running the firm's current foreign exchange position across a set of historical exchange rate changes to yield a distribution of losses in the value of the foreign exchange position, say 1,000, and then computing a percentile (the VaR). Thus, assuming a 99% confidence level and a 1-day holding period, the VaR could be computed by sorting in ascending order the 1,000 daily losses and taking the 11th largest loss out of the 1,000 (since the confidence level implies that 1 percent of losses – 10 losses – should exceed the VaR). The main benefit of this method is that it does not assume a normal distribution of currency returns, as it is well documented that these returns are not normal but rather leptokurtic. Its shortcomings, however, are that this calculation requires a large database and is computationally intensive.

The variance – covariance model assumes that (1) the change in the value of a firm's total foreign exchange position is a linear combination of all the changes in the values of individual foreign exchange positions, so that also the total currency return is linearly dependent on all individual currency returns; and (2) the currency returns are jointly normally distributed. Thus, for a 99% confidence level, the VaR can be calculated as:

$$\text{VaR} = -V_p (M_p + 2.33 S_p)$$

where V_p is the initial value (in currency units) of the foreign exchange position.

M_p is the mean of the currency return on the firm's total foreign exchange position, which is a weighted average of individual foreign exchange positions.

S_p is the standard deviation of the currency return on the firm's total foreign exchange position, which is the standard deviation of the weighted transformation of the variance-covariance matrix of individual foreign exchange positions (note that the latter includes the correlations of individual foreign exchange positions).

While the variance-covariance model allows for a quick calculation, its drawbacks include the restrictive assumptions of a normal distribution of currency returns and a linear combination of the total foreign



exchange position. Note, however, that the normality assumption could be relaxed (Longin, 2001). When a non-normal distribution is used instead, the computational cost would be higher due to the additional estimation of the confidence interval for the loss exceeding the VaR.

Monte Carlo simulation usually involves principal components analysis of the variance-covariance model, followed by random simulation of the components. While its main advantages include its ability to handle any underlying distribution and to more accurately assess the VaR when non-linear currency factors are present in the foreign exchange position (e.g., options), its serious drawback is the computationally intensive process.

8.4.3 Management of Exchange Rate Risk

After identifying the types of exchange rate risk and measuring the associated risk exposure, a firm needs to decide whether or not to hedge these risks. In international finance, the issue of the appropriate strategy to manage (hedge) the different types of exchange rate risk has yet to be settled (Jacque, 1996). In practice, however, corporate treasurers have used various currency risk management strategies depending, *ceteris paribus*, on the prevalence of a certain type of risk and the size of the firm (Allen, 2003).

Hedging strategies

Indicatively, transaction risk is often hedged tactically (selectively) or strategically to preserve cash flows and earnings, depending on the firm's treasury view on the future movements of the currencies involved. Tactical hedging is used by most firms to hedge their transaction currency risk relating to short-term receivable and payable transactions, while strategic hedging is used for longer-period transactions. However, some firms decide to use passive hedging, which involves the maintenance of the same hedging structure and execution over regular hedging periods, irrespective of currency expectations – that is, it does not require that a firm takes a currency view.

Translation, or balance sheet, risk is hedged very infrequently and non-systematically, often to avoid the impact of possible abrupt currency shocks on net assets. This risk involves mainly long-term foreign exposures, such as the firm's valuation of subsidiaries, its debt structure and international investments. However, the long-term nature of these items and the fact that currency translation affects the balance sheet rather than the income statement of a firm, make hedging of the translation risk less of a priority for management. For the translation of currency risk of a subsidiary's value, it is standard practice to hedge the net balance sheet exposures, i.e., the net assets (gross assets less liabilities) of the subsidiary that might be affected by an adverse exchange rate move.

Within the framework of hedging the exchange rate risk in a consolidated balance sheet, the issue of hedging a firm's debt profile is also of paramount importance (Marrison, 2002; Jorion and Khoury, 1996). The currency and maturity composition of a firm's debt determines the susceptibility of its net equity and earnings to exchange rate changes. To reduce the impact of exchange rates on the volatility of earnings, the firm may use an optimization model to devise an optimal set of hedging strategies to manage its currency risk. Hedging the remaining currency exposure after the optimization of the debt composition is a difficult task. A firm may use tactical hedging, in addition to optimization, to reduce the residual currency risk. Moreover, if exchange rates do not move in the anticipated direction, translation risk hedging may cause either cash flow or earnings volatility. Therefore, hedging translation risk often involves careful weighing of the costs of hedging against the potential cost of not hedging.

Economic risk is often hedged as a residual risk. Economic risk is difficult to quantify, as it reflects the potential impact of exchange rate moves on the present value of future cash flows. This may require measuring the potential impact of an exchange rate deviation from the benchmark rate used to forecast a firm's revenue and cost streams over a given period. In this case, the impact on each flow may be netted out over product lines and across markets, with the net economic risk becoming small for firms that invest in many foreign markets because of offsetting effects. Also, if exchange rate changes follow inflation differentials (through PPP) and a firm has a subsidiary that faces cost inflation above the general inflation rate, the firm could find its competitiveness eroding and its original value deteriorating as a result of exchange rate adjustments that are not in line with PPP (Froot and Thaler, 1990). Under these circumstances, the firm could best hedge its economic

exposure by creating payables (e.g., financing operations) in the currency in which the firm's subsidiary experiences the higher cost inflation (i.e., in the currency in which the firm's value is vulnerable).

Sophisticated corporate treasuries, however, are developing efficient frontiers of hedging strategies as a more integrated approach to hedge currency risk than buying a plain vanilla hedge to cover certain foreign exchange exposure (Kritzman, 1993). In effect, an efficient frontier measures the cost of the hedge against the degree of risk hedged. Thus, an efficient frontier determines the most efficient hedging strategy as that which is the cheapest for the most risk hedged. Given a currency view and exposure, hedging optimization models usually compare 100% unhedged strategies with 100% hedged using vanilla forwards and option strategies in order to find the optimal one. Although this approach to managing risk provides the least-cost hedging structure for a given risk profile, it critically depends on the corporate treasurer's view of the exchange rate. Note that such optimization can be used for transaction, translation or economic currency risk, provided that the firm has a specific currency view (i.e., a possible exchange rate forecast over a specified time period).

8.4.4 Methods of Managing Risk

- (a) Exposure Netting, i.e. creating an offsetting borrowing or asset. Also called Money Market Operations.
- (b) Forward Exchange Contracts.
- (c) Currency Futures and Options.
- (d) Appropriate Capital Structure (for long term risks) [Expectations on funds raised in Foreign Currency will also vary with exchange rate fluctuations, thereby leaving the Value of the Firm unaffected to a great extent].
- (e) Diversified production, Marketing and Financing (for Economic Risk).
- (f) Foreign Currency Bank Account, so that inflow and outflow are matched at different points time, and protecting the Firm against exchange rate fluctuations.
- (g) Currency Swap Arrangement.

8.4.5 Foreign Exchange Risk Hedging Tools

8.4.5.1 Forward Contract

Hedging refers to managing risk to an extent that it is bearable. In international trade and dealings foreign exchange plays an important role. Fluctuations in foreign exchange rates can have significant implications on business decisions and outcomes. Many international trade and business dealings are shelved or become unworthy due to significant exchange rate risk embedded in them. Historically, the foremost instrument used for managing exchange rate risk is the forward rate. Forward rates are custom agreements between two parties to fix the exchange rate for a future transaction. This simple arrangement easily eliminates exchange rate risk, however, it has some shortcomings, particularly the difficulty in getting a counter party who would agree to fix the future rate for the amount and at the time period in question. In Malaysia many businesses are not even aware that some banks do provide forward rate arrangements as a service to their customers. By entering into a forward rate agreement with a bank, the businessman simply transfers the risk to the bank, which will now have to bear this risk. Of course, the bank, in turn, may have to make some other arrangement to manage this risk. Forward contracts are somewhat less familiar, probably because no formal trading facility, building or even regulating body exists.

8.4.5.2 Futures Contract

The futures market came into existence as an answer for the shortcomings inherent in the forward market. The futures market solves some of the shortcomings of the forward market, particularly the need and the difficulty in finding a counter party. A currency futures contract is an agreement between two parties to buy or sell a particular currency at a future date, at a particular exchange rate that is fixed or agreed



upon upfront. This sounds a lot like the forward contract. In fact, the futures contract is similar to the forward contract but is much more liquid. It is liquid because it is traded in an organized exchange — i.e. the futures market. Futures contracts are standardized contracts and thus are bought and sold just like shares in a stock market. The futures contract is also a legal contract just like the forward, however, the obligation can be 'removed' prior to the expiry of the contract by making an opposite transaction, i.e. if one had purchased a futures contract then one may exit by selling the same contract. When hedging with futures, if the risk is an appreciation in value, then one needs to buy futures, whereas if the risk is a depreciation then one needs to sell futures. Consider our earlier example, instead of using forwards, ABC could have thus sold rupee futures to hedge against a rupee depreciation. Let's assume accordingly that ABC sold rupee futures at the rate RM0.10 per rupee. Hence the size of the contract is RM1,000,000. Now assume that the rupee depreciates to RM0.07 per rupee — the very thing ABC was afraid of. ABC would then close the futures contract by buying back the contract at this new rate. Note that in essence ABC bought the contract for RM0.07 and sold it for RM0.10. This gives a futures profit of RM 3,00,000 $[(RM0.10 - RM0.07) \times 1,00,00,000]$. However, in the spot market ABC gets only RM 7,00,000 when it exchanges the 10,00,000 rupees at RM0.07. The total cash flow, however, is maintained at RM 10,00,000 (RM 7,00,000 from spot and RM300,000 profit from futures). With perfect hedging the cash flow would always be RM1 million no matter what happens to the exchange rate in the spot market. One advantage of using futures for hedging is that ABC can release itself from the futures obligation by buying back the contract anytime before the expiry of the contract. To enter into a futures contract a trader, however, needs to pay a deposit (called an initial margin) first. Then his position will be tracked on a daily basis so much so that whenever his account makes a loss for the day, the trader will receive a margin call (also known as variation margin), requiring him to pay up the losses.

8.4.5.3 Currency Options

A currency option may be defined as a contract between two parties — a buyer and a seller — whereby the buyer of the option has the right but not the obligation, to buy or sell a specified currency at a specified exchange rate, at or before a specified date, from the seller of the option. While the buyer of an option enjoys a right but not an obligation, the seller of the option, nevertheless, has an obligation in the event the buyer exercises the given right. There are two types of options:

- **Call option** — gives the buyer the right to buy a specified currency at a specified exchange rate, at or before a specified date.
- **Put option** — gives the buyer the right to sell a specified currency at a specified exchange rate, at or before a specified date.

The seller of the option, of course, needs to be compensated for giving the right. The compensation is called the price or the premium of the option. The seller thus has an obligation in the event the right is exercised by the buyer.

For example, assume that a trader buys a September RM0.10 rupee call option for RM0.01. This means that the trader has the right to buy rupees for RM0.10 per rupee at anytime until the contract expires in September. The trader pays a premium of RM0.01 for this right. The RM0.10 is called the strike price or the exercise price. If the rupee appreciates over RM0.10 anytime before expiry, the trader may exercise his right and buy it for only RM0.10 per rupee. If, however, the rupee were to depreciate below RM0.10, the trader may just let the contract expire without taking any action since he is not obligated to buy it at RM0.10. In this case, if he needs physical rupee, he may just buy it in the spot market at the new lower rate.

In hedging using options, calls are used if the risk is an upward trend in price, while puts are used if the risk is a downward trend. In our ABC example, since the risk is a depreciation of rupees, ABC would need to buy put options on rupees. If rupees were to depreciate at the time ABC receives its rupee revenue, then ABC would exercise its right and thereby effectively obtain a higher exchange rate. If, however, rupees were to appreciate instead, ABC would then just let the contract expire and exchange its rupees in the spot market at the higher exchange rate. Therefore, the options market allows traders

to enjoy unlimited favourable movements while limiting losses. This feature is unique to options, unlike the forward or futures contracts where the trader has to forego favourable movements and there are also no limits to losses.

Options are particularly suited as a hedging tool for contingent cash flows, as is the case in bidding processes. When a firm bids for a project overseas, which involves foreign exchange risk, the options market allows it to quote its bid price and at the same time protect itself from the exchange rate fluctuations in the event the bid is won. In the case of hedging with forwards or futures, the firm would be automatically placed in a speculative position in the event of an unsuccessful bid, without any limit to its downside losses.

An Example of Hedging with Put Options

Consider our ABC Corp. example. Instead of already having won the contract in question, let's, however, assume that it is in the process of bidding for it — as is the common case in real life. ABC wants a minimum acceptable revenue of RM1,000,000 after hedging costs, but ABC need to quote a bid price now. In this instance, ABC would face the exchange rate risk only upon winning the bid. Options fare better as a hedging tool here compared with forwards or futures due to the uncertainty in getting the contract. Assume that it is now July and the results of the bidding will be known only in September, and that the following September options quotes are available today:

RM0.10 call @ RM0.002

RM0.10 put @ RM0.001

Assume that the size of each rupee contract is 2,000,000 rupees. The following is how ABC could make its hedging strategy:

1. First, it needs to decide whether to buy puts or calls. Since ABC would receive rupees in the future if it won the contract, its risk is a depreciation of rupees. Therefore, it should buy puts.
2. What should the bid amount be? To answer this question we need to compute the effective exchange rate after incorporating the price of put, i.e. RM0.10 minus RM0.001 which equals RM0.099. Now the bid amount is computed as $\text{RM1,000,000} / \text{RM0.099}$, which equals 10,101,010 rupees.
3. How many put contracts should it buy? To answer this, just take the bid amount and divide by the contract size, i.e. $10,101,010 / 2,000,000$ equals 5.05. Since fractions of contracts are not allowed and we don't over-hedge, 5 contracts are sufficient, with some portion going unhedged. However, if we want to guarantee a minimum revenue of RM1,000,000, we cannot tolerate any imperfections in the hedging. Therefore, in this example we should go for 6 contracts.
4. What is the cost of hedging? The cost of hedging is computed as follows: $6 \text{ contracts} \times 2,000,000 \text{ per contract} \times \text{RM0.001}$ equals RM12,000. This cost of hedging is the maximum loss possible with options.

In September, ABC would have known the outcome of the bid and by then the spot rupee rate might have appreciated or depreciated. Let's look at two scenarios where the rupee appreciates to RM0.20 in one and depreciates to RM0.05 per rupee in the other. The following table shows the four outcomes possible and their cash flow implications.

	Rupee Depreciates to RM0.05 per rupee	Rupee Appreciates to RM0.20 per rupee
Bid Won	Exchange the 10,101,010 rupees @RM0.05 = RM505,050.50 Plus profit from options: $6 \times 2,000,000 \times (RM0.10 - RM0.05) = RM600,000$ Less cost of hedging = RM12,000 Net Cash flow = RM1,093,050 (which is more than the minimum required revenue of RM1,000,000)	Exchange the 10,101,010 rupees @RM0.20 = RM2,020,202 Put options not worth exercising, therefore, just let them expire. Less cost of hedging = RM12,000 Net Cash flow = RM2,008,202 (In this case the option allows ABC to enjoy the favourable movement)
Bid Lost	In this case, the bid amount is not in consideration. However, ABC could still exercise its rights and realize a profit from the puts. Profit from options: $6 \times 2,000,000 \times RM0.05 = RM600,000$ Less cost of hedging = RM12,000 Net Cash flow = RM578,000	This is the worst case scenario that can happen. The bid is lost and also the put option ends up being not profitable. ABC loses the premium paid = RM12,000. This is the maximum loss possible.

Possible Cash Flow Outcomes for Hedging using Options

The above example illustrates how options can be used to guarantee a minimum cash flow on contingent claims. In the case the bid is won, a minimum cash flow of RM1,000,000 is guaranteed while allowing one to still enjoy a favourable movement if that does take place. If the bid is lost, the maximum loss possible is the premium paid.

An example for hedging with the call option is when a firm bids to buy a property (e.g. land) in another country. Say, a company bids to buy a piece of land in Indonesia to plant oil palm trees. Assume that the bidding is in Indonesian rupiahs. Here the risk would be an appreciation of the rupiah. Therefore, buying call options on the rupiah would be the suitable hedging strategy.

If one analyzes it carefully, the options market is simply an organized insurance market. One pays a premium to protect oneself from potential losses while allowing one to enjoy potential benefits. An analogy, for example, is when one buys car insurance, by paying the premium. If the car gets into an accident one gets compensated by the insurance company for the losses incurred. However, if no accident happens, one loses the premium paid. If no accident happens but the value of the car appreciates in the secondhand market, then one gets to enjoy the upward trend in price. An options market plays a similar role.

In the case of options, however, the seller of an option plays the role akin to an insurance company.

Money Market Operations

Money Market Operations refers to creating; an equivalent asset or liability against a Foreign Currency Liability or Receivable. It involves a series of transactions for taking the opposite position. It involves creating an Foreign Currency Asset (Deposits) or Foreign Currency Liability (Borrowings), based on the respective positions. All markets are not open and all currencies are not fully convertible. Therefore, this option may have very little practical application.

8.4.5.4 Leading and Lagging

It refers to the adjustment of the times of payments that are made in foreign currencies. Leading is the payment of an obligation before due date while lagging is delaying the payment of an obligation past due date. The purpose of these techniques is for the company to take advantage of expected devaluation or revaluation of the appropriate currencies. Lead and lag payments are particularly useful when forward contracts are not possible.

It is more attractive to use for the payments between associate companies within a group. Leading

and lagging are aggressive foreign exchange management tactics designed to take the advantage of expected exchange rate changes. Buckley (1988) supports the argument with the following example:

Subsidiary b in B country owes money to subsidiary a in country A with payment due in three months' time and with the debt denominated in US dollar. On the other side, country B's currency is expected to devalue within three months against US dollar moreover vis-à-vis country A's currency. Under these circumstances, if company b leads -pays early - it will have to part with less of country B's currency to buy US dollar to make payment to company A. Therefore, lead is attractive for the company. When we take reverse the example-revaluation expectation, it could be attractive for the lagging.

On the other hand, in case of lagging payment to an independent third party, there is always the possibility of upsetting the trading relationship, with possible loss of credit facilities or having prices increased to compensate for the delay in the receipt of funds. There is also the possibility of damage to the lagging company's external credit rating.

8.4.5.5 Currency Swaps

Currency Swap involves an exchange of cash payments in one currency for cash payments in another currency. It is an agreement to exchange principal and interest-rate obligations in different currencies at an agreed rate. Currency Swaps allows a Firm to re-denominate a loan from one currency into another currency.

Basis:

- An Indian Company will be able to get funds at a lower rate in India than abroad. Likewise, an American Company would be able to get funds at a lower rate in US than in India.
- If the American Company wants to make an investment in India and the Indian Company in the US, then the Companies would borrow in their respective countries, and exchange the interest obligations, for mutual benefit.

Example: Interest Rate offered by an American Bank and an Indian Bank are as follows-

Banks in ⇒	India	USA
Interest Rate for Indian Co.	10%	8%
Interest Rate for USA Co.	12.50%	7%

In the above case, the USA Company would borrow in the US and fund that for Indian Company's operations, and the Indian Company will borrow in India and fund that for American Company's operations. The gain of 1.50% (difference in spread) will be shared among the Company. If the gain is shared in equal measure, then the effective interest rates would be —

— For Indian Company: USA Rate of 7% Less Share in Gain 0.75% = 6.25%

— For US Company: India Rate of 12.50% Less Share in Gain 0.75% = 11.75%

8.4.5.6 Exposure Netting

Exposure netting involves offsetting exposures in one currency with exposures in the same or another currency, where exchange rates are expected to move in such a way that losses(gains) on the first exposed position should be offset by gains (losses) on the second currency exposure.

The assumption underlying exposure netting is that the net gain or loss on the entire exposure portfolio is what matters, rather than the gain or loss on any individual monetary unit.

Settlement Risk: Settlement Netting/ Settlement Risk is the difference of the summed transactions between the parties which is actually transferred.

Example: A Bank is required to pay USD 1,00,000 and USD 2,75,000 to Mr. A, and collect from him USD



1,75,000, Euro 50,000, then the net payable is called the settlement netting or settlement risk.

Situation for Exposure Netting: Exposure netting occurs where outstanding positions are netted against one another in the event of counter party default.

8.4.5.7 Currency Forward Contract Agreement

Foreign currency forward contracts are used as a foreign currency hedge when an investor has an obligation to either make or take a foreign currency payment at some point in the future. If the date of the foreign currency payment and the last trading date of the foreign currency forwards contract are matched up, the investor has in effect "locked in" the exchange rate payment amount.

By locking into a forward contract to sell a currency, the seller sets a future exchange rate with no upfront cost. For example, a U.S. exporter signs a contract today to sell hardware to a French importer. The terms of the contract require the importer to pay euros in six months' time. The exporter now has a known euro receivable. Over the next six months, the dollar value of the euro receivable will rise or fall depending on fluctuations in the exchange rate. To mitigate his uncertainty about the direction of the exchange rate, the exporter may elect to lock in the rate at which he will sell the euros and buy dollars in six months. To accomplish this, he hedges the euro receivable by locking in a forward.

This arrangement leaves the exporter fully protected should the currency depreciate below the contract level. However, he gives up all benefits if the currency appreciates. In fact, the seller of a forward rate faces unlimited costs should the currency appreciate. This is a major drawback for many companies that consider this to be the true cost of a forward contract hedge. For companies that consider this to be only an opportunity cost, this aspect of a forward is an acceptable "cost". For this reason, forwards are one of the least forgiving hedging instruments because they require the buyer to accurately estimate the future value of the exposure amount.

Like other future and forward contracts, foreign currency futures contracts have standard contract sizes, time periods, settlement procedures and are traded on regulated exchanges throughout the world. Foreign currency forwards contracts may have different contract sizes, time periods and settlement procedures than futures contracts. Foreign currency forwards contracts are considered over-the-counter (OTC) because there is no centralized trading location and transactions are conducted directly between parties via telephone and online trading platforms at thousands of locations worldwide.

Key Points:

- Developed and grew in the late '70s when governments relaxed their control over their currencies
- Used mainly by banks and corporations to manage foreign exchange risk
- Allows the user to "lock in" or set a future exchange rate.
- Parties can deliver the currency or settle the difference in rates with cash.

Example: Currency Forward Contracts

Corporation A has a foreign sub in Italy that will be sending it 10 million euros in six months. Corp. A will need to swap the euro for the euros it will be receiving from the sub. In other words, Corp. A is long euros and short dollars. It is short dollars because it will need to purchase them in the near future. Corp. A can wait six months and see what happens in the currency markets or enter into a currency forward contract. To accomplish this, Corp. A can short the forward contract, or euro, and go long the dollar.

Corp. A goes to Citigroup and receives a quote of .935 in six months. This allows Corp. A to buy dollars and sell euros. Now Corp. A will be able to turn its 10 million euros into $10 \text{ million} \times .935 = 9,350,000$ dollars in six months.

Six months from now if rates are at .91, Corp. A will be ecstatic because it will have realized a higher exchange rate. If the rate has increased to .95, Corp. A would still receive the .935 it originally contracts

to receive from Citigroup, but in this case, Corp. A will not have received the benefit of a more favorable exchange rate.

Extent of Forward Cover:

Aspect	Full Forward Cover	Partial Forward Cover
Meaning	Full cover refers to buying or selling (as appropriate) the foreign currency equivalent to that foreign currency liability or receivable.	It refers to buying or selling (as appropriate) the foreign currency at less than the corresponding foreign currency liability or receivable.
Example	Against a Dollar Receivable of USD 10,000, selling USD 10,000 in the Forward Cover market.	Against a Euro Receivable of 50,000, selling Euro 30,000 in the Forward Cover market.
Applicability	When the Firm is sure that the Foreign Currency will fall or rise.	Firm is not 100% sure that the Foreign Currency will fall or rise.

The differences between long and short positions in forward markets are as follows:

- The long position holder is the buyer of the contract and the short position holder is the seller of the contract.
- The long position will take the delivery of the asset and pay the seller of the asset the contract value, while the seller is obligated to deliver the asset versus the cash value of the contract at the origination date of this transaction.
- When it comes to default, both parties are at risk because typically no cash is exchanged at the beginning of the transaction. However, some transactions do require that one or both sides put up some form of collateral to protect them from the defaulted party.

Procedures for Settling a Forward Contract at Expiration

A forward contract at expiration can be settled in one of two ways:

- 1. Physical Delivery** - Refers to an option or futures contract that requires the actual underlying asset to be delivered on the specified delivery date, rather than being traded out with offsetting contracts. Most derivatives are not actually exercised, but are traded out before their delivery dates. However, physical delivery still occurs with some trades: it is most common with commodities, but can also occur with other financial instruments. Settlement by physical delivery is carried out by clearing brokers or their agents. Promptly after the last day of trading, the regulated exchange's clearing organization will report a purchase and sale of the underlying asset at the previous day's settlement price (also referred to as the "invoice price"). Traders who hold a short position in a physically settled security futures contract to expiration are required to make delivery of the underlying asset. Those who already own the assets may tender them to the appropriate clearing organization. Traders who do not own assets are obligated to purchase them at the current price.

Exchanges specify the conditions of delivery for the contracts they cover. Acceptable locations for delivery (in the case of commodities or energies) and requirements as to the quality, grade or nature of the underlying asset to be delivered are regulated by the exchanges. For example, only certain Treasury bonds may be delivered under the Chicago Board of Trade's Treasury bond future. Only certain growths of coffee may be delivered under the Coffee, Sugar and Cocoa Exchange's coffee future. In many commodity or energy markets, parties want to settle futures by delivery, but exchange rules are too restrictive for their needs. For example, the New York Mercantile Exchange requires that natural gas be delivered only at the Henry Hub in Louisiana, a location that may not be convenient for all futures traders.

- 2. Cash Settlement** - Refers to an option or futures contract that requires the counterparties to the contract to net out the cash difference in the value of their positions. The appropriate party



receives the cash difference. In the case of cash settlement, no actual assets are delivered at the expiration of a futures contract. Instead, traders must settle any open positions by making or receiving a cash payment based on the difference between the final settlement price and the previous day's settlement price. Under normal circumstances, the final settlement price for a cash-settled contract will reflect the opening price for the underlying asset. Once this payment is made, neither the buyer nor the seller of the futures contract has any further obligations on the contract.

Terminating a Forward Contract Prior to Expiration

Parties to a futures contract may also terminate the contract prior to expiration through an **offset**. Offset is the transaction of a reversing trade on the exchange. If you are long 20 March soybean futures traded on the Chicago Board of Trade, you can close the position by taking an offsetting short position in 20 March soybean contracts on the same exchange. There will be a final margining at the end of the day, and then the position will be closed. In other words, if you buy a futures contract and subsequently sell a comparable contract, you have offset your position and the contract is extinguished. Offset trades must match in respect to the underlying asset, delivery dates, quantity, etc., or the original position will not be effectively terminated. In such cases, price movements in the original contract will continue to result in gains or losses.

Compare this to the forward market wherein if you buy a forward contract and then sell an identical forward contract you are left with obligations under two contracts - one long and one short

Default Risk and Early Termination

Default risk on early termination only applies to forward contracts because there is no default risk on futures. (As we stated earlier, futures trades made on a formal exchange are cleared through a clearing organization, which acts as the buyer to all sellers and the seller to all buyers. The clearing house acts as a counterparty, guaranteeing delivery and payment and nullifying any default risk.)

Forward contracts are negotiated agreements between buyer and seller. To enter into a forward contract, it is necessary to find someone who wants to buy exactly what you want to sell when and where you want to sell it. Without a formal exchange and clearing house to guarantee delivery and payment, there is always a chance that either the buyer or the seller will default on an obligation. If one of these counterparties fails, the other is still responsible for performing under the contract. Traders in forward contracts who re-enter the market to execute a reversing trade prior to the expiration date will effectively *increase* their default risk exposure because they will be dealing with two different counterparties, both of which have to live up to their ends of the bargain. To extinguish default risk on a forward contract, a trader must place the reversing position with *the same* counterparty and under the same terms as in the originally contract. Obviously, this makes it difficult to get out of a forward contract prior to termination.

8.4.5.8 Roll Over of Forward Contract

In the forex (FX) market, rollover is the process of extending the settlement date of an open position. In most currency trades, a trader is required to take delivery of the currency two days after the transaction date. However, by rolling over the position - simultaneously closing the existing position at the daily close rate and re-entering at the new opening rate the next trading day - the trader artificially extends the settlement period by one day.

Often referred to as tomorrow next, rollover is useful in FX because many traders have no intention of taking delivery of the currency they buy - rather, they want to profit from changes in the exchange rates. Since every forex trade is transacted by borrowing one country's currency to buy another, receiving and paying interest is a regular occurrence. At the close of every trading day, a trader who took a long position in a high yielding currency relative to the currency that he or she borrowed will receive an amount of interest in his or her account. Conversely, a trader will need to pay interest if the currency he or she borrowed has a higher interest rate relative to the currency that he or she purchased. Traders who do not want to collect or pay interest should close out of their positions by 5pm ET.

Note that the interest that is received or paid by a currency trader in the course of these forex trades is regarded by the IRS as ordinary interest income or expense. For tax purposes, the currency trader should keep track of interest received or paid, separate from regular trading gains and losses.

8.4.5.9 Cross-Currency Roll Over

Cross Currency Roll Over contracts are contracts to cover overseas leg of long term foreign exchange liabilities or assets. The cover is initially obtained for six months & later extended for further period of 6 months & so on.

Roll Over charge or benefit depends on forward premium or discount, which in turn, is a function of interest rate differential between US dollar & the other currency. There is no risk of currency appreciation or depreciation in the overseas leg.

Roll over for a maturity period exceeding 6 months is not possible because in the inter-bank market, quotations beyond 6 months are not available.

Under the Roll over contracts the basic rate of exchange is fixed but loss or gain arises at the time of each Roll over depending upon the market conditions.

8.4.5.10 Money Market Hedge

Money Market Operations refers to creating an equivalent asset or liability against a Foreign Currency Liability or Receivable. It involves a series of transactions for taking the opposite position. It involves creating an Foreign Currency Asset (Deposits) or Foreign Currency Liability (Borrowings), based on the position it is.

In hedging Foreign Currency risk under the Money Market Operations route, the following steps are involved —

Step	Process
1	Identification of Position, i.e. whether the Firm wants to hedge its position against a Foreign Currency Receivable [Asset] or a Foreign Currency Payable [Liability]
2	Creation of Foreign Currency Liability or Asset, such that at the time of maturity — (a) Foreign Currency Liability including Interest = Foreign Currency Receivable (b) Foreign Currency Asset including Interest = Foreign Currency Payable

(a) Hedging against Foreign Currency Receivable:

Facts: Firm will receive Foreign Currency at Maturity. To realize it in home currency, the Firm will **SELL** Foreign Currency at Maturity.

Inference: $\Rightarrow$ Foreign Currency Receivable is an Asset $\Rightarrow$ Under Money Market Hedge, Liability in Foreign Currency should be created $\Rightarrow$ Firm should borrow in Foreign Currency and Invest in Home Currency.

Action	Time	Activity
Borrow	Now	Borrow in Foreign currency, at its Borrowing Rate, which including the interest payable thereon till the maturity, will be equivalent to the Foreign Currency Receivable at the time of maturity. $\text{Amount Borrowed} = \frac{\text{Foreign Currency Receivable}}{1 + \text{Borrowing Interest Rate for the Period Till Maturity}}$



Convert	Now	Convert the Foreign Currency Borrowings at Spot Rate to Local / Home Currency. Home Currency Realized = Borrowings x Bid Rate for the Foreign Currency in terms of Home Currency.
Invest	Now	Invest the home currency realized in Home Currency Deposits.
Realize	Maturity	Realize the maturity value of Home Currency Deposits.
Receive	Maturity	Receive the Foreign Currency Remittance from the Customer abroad.
Repay	Maturity	Repay the Foreign Currency Loan using the inward remittance from the Foreign Customer.

(b) Hedging Against Foreign Currency Payable:

Facts: Firm will pay Foreign Currency at Maturity. To repay the Liability, the Firm will **BUY** Foreign Currency at Maturity.

Inference: $\Rightarrow$ Foreign Currency Payable is a Liability $\Rightarrow$ Under Money Market Hedge, Asset in Foreign Currency should be created $\Rightarrow$ Firm should borrow in Home Currency and Invest in Foreign Currency.

Action	Time	Activity
Borrow	Now	Borrow in Home Currency, sum equivalent to amount required for investing in Foreign Currency Deposits, which would yield at maturity, an amount equivalent to the Foreign Currency Liability. $\text{Amount Borrowed} = \frac{\text{Foreign Currency Payable}}{1 + \text{Forex Deposit Rate for the Period Till Maturity}} \times \text{Spot Ask Rate}$
Convert	Now	Convert the Home Currency Borrowings into Foreign Currency at Spot Rate
Invest	Now	Invest the Foreign Currency purchased in Foreign Currency Deposits.
Realize	Maturity	Realize the maturity value Foreign Currency Deposits.
Settle	Maturity	Use the Maturity Value of Foreign Currency Deposits to settle the Foreign Currency Liability.
Repay	Maturity	Repay the amount borrowed in Home Currency along with interest.

Money Market Operations and Covered interest Arbitrage

Though the sequence of activities, for both Money Market Operations and Covered Interest Arbitrage is similar, the difference lies the purpose of entering into these actions —

Aspect	Covered Interest Arbitrage	Money Market Operations
Purpose	Covered Interest Arbitrage is undertaken with a view to make a gain out of inefficiency in fixing the Forward Quote.	Money Market Operations are done to hedge a Foreign Currency Risk associated with a future receivable or payable. The purpose is to eliminate the uncertainty and not to make gain.
Result	It will always result in gain.	It may not result in gain when compared with the spot rate prevailing on the maturity date.
Pre-Requisites	It does not require any future liability or receivable to be present before borrowing or investing.	To undertake money market operations, it is a prerequisite to have an ascertained future receivable or liability.

8.4.5.11 Asset & Liability Management

Asset and Liability- Management refers to creating the liability in the same currency as the asset. If Fixed Assets are acquired for Foreign Operations for use abroad, then the funding is done through Foreign Currency Liability. Asset Liability Management would be fruitful, only if operating cash flows are also denominated in the Foreign Currency i.e. only if an entity has operations abroad. A proper Asset Liability Management would result in proper tax planning and the financials will present a true or an unbiased picture of the state of operations.

Example: Purchase of Land in United Kingdom by a GBP denominated loan. Change in exchange rate would affect both the asset and liability values, and therefore, the consolidated results would also reflect proper picture.

8.5 FOREIGN INVESTMENT ANALYSIS

Global corporations evaluating foreign investments find their analysis complicated by a variety of problems that are rarely, if ever, faced by domestic firms. Recent times have seen a massive surge in cross-border direct investments. With direct (as distinct from Portfolio) investments, range from purchase of new equipment to replace existing equipment, to an investment in an entirely new business venture in a country where, typically, manufacturing or assembly has not previously been done. The technique is also useful for decisions to disinvest, that is, liquidate or simply walk away from an existing for investment. The overall financial investment decision has two components like the quantitative analysis of available data and the decision to invest abroad as part of the firm's strategic plans. Investments of sufficient size as to be important are usually conceived initially because they fit into a firm's strategic plan. The quantitative analysis which follows is usually done to determine if implementation of the strategic plan is financially feasible or desirable. Foreign investment deals with the quantitative aspects of foreign investment analysis. It treats, first, the general methodology of capital budgeting, second, the international complexities of that procedure, and third, the implications of international accounting for conclusions reached by that methodology. For convenience, the United States will be regarded as "home". However, the principles discussed have relevance for any home company investing in a foreign language. In recent years, abundance of new research has been conducted in one area of international corporate finance. The major thrust of this work has been to apply the methodology and logic of financial economics to the study of key international financial decisions. Critical problem areas, such as foreign exchange risk management and foreign investment analysis, have benefited from the insights provided by financial economics – a discipline that emphasizes the use of economic analysis to understand basic working of financial markets, particularly the measurement and pricing of risk and the international allocation of funds.

Taxes levied by the Host Country (Foreign Country) will be significantly different from the taxes levied in the Home Country. Even in the Host Country, taxes on residents will vary from taxes on non-residents. Therefore, taxes on income and other indirect tax levies should be given appropriate considerations.

Political Risks: It is the possibility that the political conditions surrounding the project may become adverse, due to change in Host Country's Government Policies. Examples of Political Risk —

- (a) Expropriation, i.e. Seizure of property/ nationalization of industry without paying full compensation [In India Retail Trades have been opened up for Foreign Investment. At a later date, the Government may ban Foreign Investment in Retail Trade.]
- (b) Banning of Products to cater to local demand.
- (c) Levy of additional taxes on profits.
- (d) Exchange control regulations blocking flow of funds.
- (e) Restrictions on employment of foreign managerial / technical personnel Considering the above, a higher risk premium for the project in the foreign country should be adjusted.



Economic risks: Economic risks which influence the success of a project are exchange rate changes and inflation. Effect of these should also be considered while evaluating based on NPV.

Exchange Rate Risk: Impact of exchange rate changes and inflation upon incremental revenue and upon each element of incremental cost need to be computed.

Foreign investment proposal under Discounted Cash Flow approach

General Principles: The general principles applicable to an international investment are similar to domestic investment decisions, which are —

- (a) Discounting incremental cash flow of the investment.
- (b) Discounting should be done based on opportunity cost of capital.
- (c) The entity should be able to invest the operating surplus for a return which is equivalent to the opportunity cost of capital.

Special Consideration: In case of evaluation of Foreign Investment proposal, consideration should be accorded to the exchange rate applicable for the Foreign Investment Proposals. Following are the points to be noted in this regard —

- (a) **Foreign Currency Cash Flow:** If the project is evaluated based on the Foreign Currency cash Flows, then the discount rate applied should be adjusted for Foreign Currency risks or movements.
- (b) **Home Currency Cash Flow:** If the project is evaluated based on the Home Currency Cash Flows (i.e. by estimating the Future Spot Rate and converting foreign currency cash flows), then the opportunity cost of capital applicable to Home Currency Cash Flows.

Steps Involved:

(a) Cash Flows in Foreign Currency:

Step 1: Compute the Operating and Investing Cash Flows in Foreign Currency

Step 2: Compute the appropriate discount rate applicable for the Foreign Currency Cash Flow.

Step 3: Evaluate the project by discounting the Foreign Currency Cash Flows using the Foreign Currency Discount Rate i.e. Compute NPV in Foreign Currency Terms.

Step 4: Apply the Spot Rate to convert NPV in Foreign Currency Terms to Home Currency NPV.

(b) Cash Flows in Home Currency:

Step 1: Compute the Operating and Investing Cash Flows in Foreign Currency.

Step 2: Compute the expected Future Spot Rate based on inflation, interest rate differentials or annualized appreciation or depreciation in Foreign Currency.

Step 3: Convert the Foreign Currency Cash Flows into Home Currency Cash Flows using such Future Spot Rates.

Step 4: Compute the Home Currency Discount Rate.

Step 5: Evaluate the project by discounting the Cash flows expressed in Home Currency using the Home Currency Discount Rate to identify the Project NPV in Home Currency Terms.

Computation of Foreign Currency Discount Rates:

- (a) **Fischer Effect (Inflation Adjustment):** Real Rate of Return will be identical for a project in all the countries. Only the inflation for different countries will vary and therefore, only that should be adjusted to ascertain the appropriate discount rate —
 - Identify the Real Rate of Return for the project.

- Apply inflation applicable for the Foreign Country, to identify- the Nominal Discount Rate for discounting Foreign Currency Cash Flows.

(b) Risk Premium Model: Required Rate of Return for a project in any country will have two components i.e. Risk Free Rate of Return and the Risk Premium. Risk Premium for a project should be identical for a project in different countries. Therefore,- the risk free rate appropriate for the Foreign Country should be adjusted for the Risk Premium of the Project to identify the appropriate discount rate.

- Identify the Risk Premium for the Project, as if it will be denominated in Home Currency.

$$1 + \text{Home Currency Discount Rate} = \left(1 + \text{Home Currency Risk Free Rate} \right) \times \left(1 + \text{Project Risk Premium} \right)$$

$$\Rightarrow \text{Project Risk Premium} = \frac{1 + \text{Home Currency Discount Rate}}{1 + \text{Home Currency Risk Free Rate}} - 1$$

- Identify the Foreign Currency Risk Free Rate of Return.
- Apply the Project Risk Premium to the Foreign Currency Risk Free Rate of Return to determine the Foreign Currency Discount Rate.

$$1 + \text{Foreign Currency Discount Rate} = \left(1 + \text{Foreign Currency Risk Free Rate} \right) \times \left(1 + \text{Project Risk Premium} \right)$$

8.5.1 International Portfolio Investment

A grouping of investment assets that focuses on securities from foreign markets rather than domestic ones is known as International Portfolio Investment. An international portfolio is designed to give the investor exposure to growth in emerging and international markets and provide diversification.

In recent years, economic activity has been characterized by a dramatic increase in the international dimensions of business operations. National economies in all parts of the world have become more closely linked by way of a growing volume of cross-border transactions, not only in terms of goods and services but even more so with respect to financial claims of all kinds. Reduced regulatory barriers between countries, lower cost of communications as well as travel and transportation have resulted in a higher degree of market integration. With respect to real goods and services, this trend towards globalization is clearly reflected in the worldwide growth of exports and imports as a proportion of GDP of individual countries. Consequently, consumption patterns have been internationalized as well, both directly and indirectly.

Alongside the increase in international trade, one can easily observe the globalization of financial activity. Indeed, the growth of cross-border or international flows of financial assets has outpaced the expansion of trade in goods and services. These developments are underpinned by advances in communication and transportation technology. They make geographic distances less significant, and hence, extend the scope of information as well as the speed with which it is available, thus leading to faster and more efficient global financial operations. By the same token, and not unrelated to the technologically driven developments just mentioned, policy-induced capital market liberalization, such as the abolition of capital and exchange controls in most countries, permits an ever growing volume of international financial flows.

As a consequence, investment opportunities are no longer restricted to domestic markets, but financial capital can now seek opportunities abroad with relative ease. Indeed, international competition for funds has caused an explosive growth in international flows of equities as well as fixed-income and monetary



instruments. Emerging markets, in particular, as they have become more and more accessible, have begun to offer seemingly attractive investment alternatives to investors around the globe.

International capital flows are further driven by a divergence in population trends between developed and developing countries. Mature, industrialized countries today are characterized by aging populations with significant needs for private capital accumulation. The underlying demand for savings vehicles is further reinforced by the necessary shift from pay-as-you-go pension schemes towards capital market-based arrangements. By the same token, developing countries with their relatively young populations require persistent and high levels of investment in order to create jobs and raise standards of living in line with the aspirations of their impatient populations. All this provides significant incentives for the growth of international markets for all kinds of financial claims in general and securities in particular.

While the environment has undoubtedly become more conducive to international portfolio investment, the potential benefits for savers/investors have lost none of their attractions. There are the less-than-perfect correlations between national economies, the possibility of hedging an increasingly international consumption basket, and the participation in exceptional growth opportunities abroad, which can now be taken advantage of through international portfolio investment. However, there is considerable controversy among investment professionals, both in academia as well as in the financial services industry, on the issue to what extent these intuitively perceived benefits of international portfolio investment are sufficiently significant.

When the circumstances of the real world are taken into account, additional risks, costs and other constraints to international portfolio investment at best limit the potential advantages, at worst negate the benefits.

Let us now discuss first the different types of unique risks and constraints that are faced by an international portfolio investor:

8.5.1.1 Unique Risks

The unique international risk can be divided into two components: exchange risk (broadly defined) and political (or country) risk. These are discussed as follows:

(1) Currency Risk

As foreign assets are denominated, or at least expressed, in foreign currency terms, a portfolio of foreign securities is usually exposed to unexpected changes in the exchange rates of the respective currencies (exchange rate risk or currency risk). These changes can be a source of additional risk to the investor, but by the same token can *reduce* risk for the investor. The net effect depends, first of all, on how volatility is measured, in particular whether it is measured in “real” terms against some index of consumption goods, or in nominal terms, expressed in units of a base currency. In any case, the effect ultimately depends on the specifics of the portfolio composition, the volatility of the exchange rates, most importantly on the correlation of returns of the securities and exchange rates, and finally on the correlation between the currencies involved. If total risk of a foreign security is decomposed into the components currency risk and volatility in local-currency value, exchange risk contributes significantly to the total volatility of a security. Nevertheless, total risk is less than the sum of market and currency risk.

For equities, currency risk represents typically between 10 and 15 percent of total risk when measured in nominal terms, and the relative contribution is generally even higher for bonds. However, currency risk can be diversified away by investing in securities denominated in many different currencies, preferably with offsetting correlations. In addition to diversification, exchange risk can of course be reduced by means of “hedging” i.e. establishing short or long positions via the use of currency futures and forwards, which represent essentially long or short positions of fixed income instruments, typically with maturities of less than one year. It is not surprising therefore that such strategy continues to be heatedly debated by academics and practitioners alike. In particular, there is no clear guidance with regard to the optimal hedge ratio in an international portfolio investment framework. Contrary to some authors who point out the performance improvement due to “complete” hedges, other researchers find indications that

currency hedges are opted to reduce total portfolio risk in the short run, but actually increase the return variance in the long run if the portfolio is fully hedged.

(2) Country Risk

The fact that a security is issued or traded in a different and sovereign political jurisdiction than that of the consumer-investor gives rise to what is referred to as country risk or political risk. Country risk in general can be categorized into transfer risks (restrictions on capital flows), operational risks (constraints on management and corporate activity) and ownership-control risks (Government policies with regard to ownership/managerial control). It embraces the possibility of exchange controls, expropriation of assets, changes in tax policy (like withholding taxes being imposed after the investment are undertaken) or other changes in the business environment of the country. In effect, country risk are local Government policies that lower the actual (after tax) return on the foreign investment or make the repatriation of dividends, interest, and principal more difficult. Political risk also includes default risk due to Government actions and the general uncertainty regarding political and economic developments in the foreign country. In order to deal with these issues, the investor needs to assess the country's prospects for economic growth, its political developments, and its balance of payments trends. Interestingly, political risk is not unique to developing countries. In addition to assessing the degree of Government intervention in business, the ability of the labour force and the extent of a country's natural resources, the investor needs to appraise the structure, size, and liquidity of its securities markets.

8.5.1.2 Institutional Constraints for International Portfolio Investment

Institutional constraints are typically Government-imposed, and include taxes, foreign exchange controls, and capital market controls, as well as factors such as weak or nonexistent laws protecting the rights of minority stockholders, the lack of regulation to prevent insider trading, or simply inadequate rules on timely and proper disclosure of material facts and information to security holders. These are discussed below:

(1) Taxation

When it comes to international portfolio investment, taxes are both an obstacle as well as an incentive to cross-border activities. Not surprisingly, the issues are complex in large part because rules regarding taxation are made by individual Governments, and there are many of these, all having very complex motivations that reach far beyond simply revenue generation. It is obvious then, since tax laws are national, that it is individual countries that determine the tax rates paid on various returns from portfolio investment, such as dividends, interest and capital gains, all these rules differ considerably from country to country. Countries also differ in terms of institutional arrangements for investing in securities, but in all countries there are institutional investors which may be tax exempt (e.g. pension funds) or have the opportunity for extensive tax deferral (insurance companies). However, countries do not tax returns from all securities in the same way. Income from some securities tends to be exempt in part or totally from income taxes. Almost all countries tax their resident taxpayers on returns from portfolio investment, whether the underlying securities have been issued and are held abroad or at home. This is known as the worldwide income concept. There are a significant number of countries, however, who tax returns from foreign securities held abroad only when repatriated. Obviously, such rules promote a pattern of international portfolio investment where financial wealth is kept "offshore," preferably in jurisdictions that treat foreign investors kindly. Such jurisdictions are frequently referred to as "tax havens." Since such tax havens benefit from the financial industry that caters to investors from abroad, they often make themselves more attractive by adopting law confidentiality provisions, generally referred to as "secrecy laws," protecting the identity of (foreign) investors from the prying eyes of foreign Governments, creditors, relatives and others. It is not surprising, therefore, that tax havens are also used by investors from countries that do not exempt returns from foreign portfolio investment. Apart from differences in national tax regimes, barriers to international portfolio investment are primarily created by "withholding taxes" that most countries in the world (except tax havens) level on investors residing in other countries, on dividends, interest and royalties paid by their resident borrowers.



(2) Foreign Exchange Controls

While the effect of taxation as an obstacle to international portfolio investment is only incidental to its primary purpose, which is to raise revenue, exchange controls are specifically intended to restrain capital flows. Balance of payment reasons or the effort to reserve financial capital for domestic uses lead to these controls. They are accomplished by prohibiting the conversion of domestic funds for foreign moneys for the purpose of acquiring securities abroad. Purchases of securities are usually the first category of international financial transactions to be subjected to, and the last to be freed from, foreign exchange controls. While countries are quite ready to restrict undesired capital inflows and outflows, they prove reluctant to remove controls when the underlying problem has ceased to exist, or even when economic trends have reversed themselves. Inflow constraints limit the fraction of a domestic firm's equity that may be held by foreign investors. With a binding inflow constraint, one would expect two different prices for domestic assets. Because of the diversification benefit offered by holding foreign securities, there should be a premium on those shares available to foreign investors. On the other hand, outflow constraints limit the amount of capital a domestic investor may spend on foreign assets. Under these conditions, one would expect that, since domestic investors must pay a premium for foreign assets, they will try and substitute those assets with cheap domestic near-substitutes. Thus, foreign asset premiums imply a home bias in portfolio selection. While inflow constraints create a premium on "foreign" share prices, outflow constraints and the home bias will create a premium on "domestic" share prices. Thus, it remains unclear which of the price effects dominates.

(3) Capital Market Regulations

Regulations of primary and secondary security markets typically aim at protecting the buyer of financial securities and try to ensure that transactions are carried out on a fair and competitive basis. These functions are usually accomplished through an examining and regulating body, such as the SEBI in India. Supervision and control of practices and information disclosure by a relatively impartial body is important for maintaining investors' confidence in a market. It is crucial for foreign investors who will have even less direct knowledge of potential abuses, and whose ability to judge the conditions affecting returns on securities may be very limited. Most commonly, capital market controls manifest themselves in form of restrictions on the issuance of securities in national capital markets by foreign entities, thereby making foreign securities unavailable to domestic investors. Moreover, some countries put limits on the amount of investment that the local investors can do abroad or constrain the extent of foreign ownership in national companies. While few industrialized countries nowadays prohibit the acquisition of foreign securities by private investors, institutional investors face a quite different situation. Indeed, there is almost no country where financial institutions, insurance companies, pension funds, and similar fiduciaries are not subject to rules and regulations that make it difficult for them to invest in foreign securities.

(4) Transaction Costs

Transaction costs associated with the purchase of securities in foreign markets tend to be substantially higher compared to buying securities in the domestic market. Clearly, this fact serves as an obstacle to international portfolio investment. Trading in foreign markets causes extra costs for financial intermediaries, because access to the market can be expensive. The same is true for information about prices, market movements, companies and industries, technical equipment and everything else that is necessary to actively participate in trading. Moreover, there are administrative overheads, costs for the data transfer between the domestic bank and its foreign counterpart. Therefore, financial institutions try to pass these costs on to their customers, i.e. the investor. Simply time differences can be a costly headache, due to the fact that someone has to do transactions at times outside normal business hours. However, transactions costs faced by international investors can be mitigated by the characteristic of "liquidity," providing depth, breadth, and resilience of certain capital markets, thus reducing this constraint and as a consequence inducing international portfolio investment to these countries. Issuers from the investors' countries will then have a powerful incentive to list their securities on the exchange(s) of such markets. The development of efficient institutions, the range of expertise and experience available, the volume of transactions and breadth of securities traded, and the readiness with which the market can absorb large, sudden sales or purchases of securities at relatively stable prices all vary substantially from country to country.

(5) Familiarity with Foreign Markets

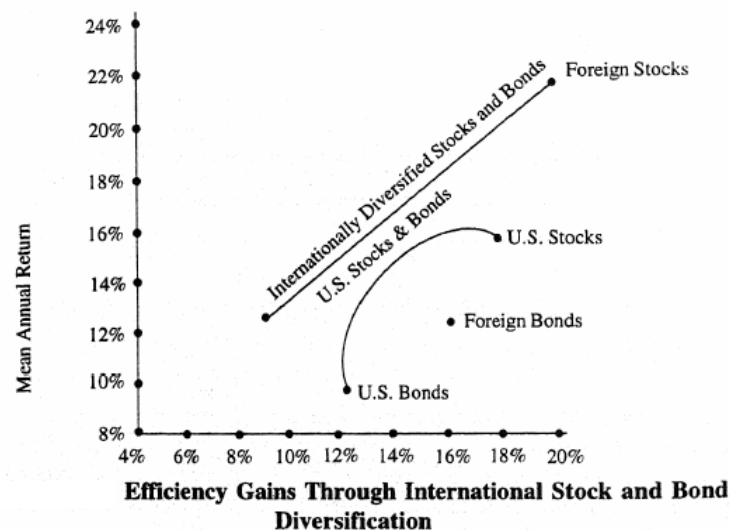
Finally, investing abroad requires some knowledge about and familiarity with foreign markets. Cultural differences come in many manifestations and flavours such as the way business is conducted, trading procedures, time zones, reporting customs, etc. In order to get a full understanding of the performance of a foreign company and its economic context, a much higher effort has to be made on the investor's side. He might face high cost of information, and the available information might not be of the same type as at home due to deviations in accounting standards and methods (e.g. with regard to depreciation, provisions, pensions), which make their interpretation more difficult. However, multinational corporations increasingly publish their financial information in English in addition to their local language and adjust the style, presentation and frequency of their disclosure, e.g., of earnings estimates, to Indian standards. Moreover, major financial intermediaries provide information about foreign markets and companies to investors as international investment gains importance; the same is true for data services that extend their coverage to foreign corporations. Sometimes, existing or perceived cultural differences represent more of a psychological barrier than a barrier of a real nature. As the benefits from international investment/diversification are known, it might be worthwhile to invest a reasonable amount of time studying foreign markets in order to overcome barriers and take advantage of the gains possible.

8.5.1.3 Benefits of International Portfolio Investment

Investments in international market have the following advantages:

- (1) **Attractive Opportunities:** While the Indian securities market and real estate market have provided excellent returns in recent years, valuations in many sectors have become somewhat stretched. Savvy investors are aware that attractive opportunities are available outside.
- (2) **Diversification Benefits:** By diversifying across nations whose economic cycles do not move perfect lockstep, investors can achieve a better risk-return tradeoff. In general broader the diversification, the less variable the returns are. Securities returns are less correlated across countries than within countries. This is because of political, institutional factors vary across countries - e.g., currency markets, regulation/deregulation, general economic conditions, business cycle differences, political issues, central bank issues, fiscal policy, industry structure, etc. Gains from international portfolio diversification depend on the degree of correlation ($-1 \leq \rho \leq +1$) between the home country and a foreign country. The general rule for this is that the greater the degree of correlation between two countries' markets, the lower the benefit of combining those countries in a portfolio or vice-e-versa.

Following figure shows Jorion's estimate of the gains from international stock and bond diversification from the perspective of a U.S. investor.





8.5.1.4 Channels for International Portfolio Investment

Investors who wish to benefit from the ownership of foreign securities can implement their portfolio strategy in a number of ways, each of which has its peculiar advantages and drawbacks. These are discussed as follows:

(A) Direct Foreign Portfolio Investment

This type of strategy is normally done by large investors. This can be done in following two ways:

- (1) Purchase of Foreign Securities in Foreign Markets:** The most direct way to implement international portfolio investment is the purchase of foreign securities directly in the respective local (foreign) market of the issuer. While restrictions on outward International portfolio investors have been eliminated by many countries, theoretically foreign investors could place orders through banks or securities brokers either in the domestic or foreign country, when they wish to purchase foreign securities. This is true for both outstanding securities and new issues. When the securities have to be purchased in a secondary market, it is usually in the domestic market of the issuing entity, i.e. the borrower. At this point a number of problems arise. On a technical level, there are difficulties with the delivery of the certificates. Also, there is the expense of making timely payment in foreign funds. Finally, investors may find it difficult to secure good information on the situation of the issuer, conversion and purchase offers, and rights issues, and to collect interest and dividends. Many of these technical problems stem from a lack of international integration of securities markets. Because of a combination of extensive regulation to protect the investing public from fraud, conflict of interest, or gross incompetence, or the resistance of entrenched local institutions to competition, especially from abroad, organized securities markets have been less open to securities firms operating on a multinational basis than, say, markets for commercial banking services.
- (2) Purchase of Foreign Securities in the Domestic Market:** In some countries, the possibility exists to purchase foreign securities in the domestic market of the investor. This represents in many respects a convenient alternative for purchasing foreign securities abroad. Foreign securities are available to the investor domestically as well, if the issuing corporation sells its securities not only in the market of the country where it is incorporated, but also in other markets. Such transactions are often accompanied by a listing of the securities usually on one of the exchanges of the country where the securities are placed. Normally, a minimum number of securities must be distributed among local investors as a requirement for listing, or alternatively the listing is a prerequisite for the successful placement of a substantial issue. Since the latter part of the 1980s, world financial markets have witnessed a considerable volume of so-called "Global"-equity issues, often in connection with the privatization of state-owned enterprises. Local listing fees as well as different disclosure requirements can make multiple listings quite expensive for corporations.

(B) Indirect Foreign Portfolio Investment

This type of strategy is normally done by small investors. This can be done in following ways:

- (1) Equity-linked Eurobonds:** As it appears difficult and/or costly to invest internationally by purchasing foreign securities directly because of burdensome procedures, lack of information, differences in accounting standards, low liquidity and limited choice of domestically available foreign shares, indirect foreign portfolio investment represents a viable alternative strategy. One way proposed for this approach is through the acquisition of securities whose value is closely linked to foreign shares such as equity-linked eurobonds. These are basically eurobonds with warrants and convertible eurobonds. They represent hybrid financial instruments that consist of a straight debt component and a call option on the foreign stock. In the case of warrants, these options can and often are separated from the debt instrument and traded individually. With convertible eurobonds, the two components of the instrument are unchangeably tied to each other. Due to the equity component of eurobonds with warrants and convertible eurobonds, the value of these instruments is not only dependent on the movement of interest rates (as straight debt), but also changes with the developments of the underlying equity. Also, for some equity markets that

are largely closed to outside investors, warrants or embedded equity options can offer a way to circumvent existing restrictions and open access to these markets through the back door, or avoid settlement problems in underdeveloped markets. Warrants, once separated from the bond, tend to return to their home market and serve as equity options — especially if these instruments are restricted or prohibited. From this perspective, equity-linked eurobonds can be useful instruments in the context of international portfolio investment. Moreover, they represent a means to some institutional investors whose equity investments are restricted to still participate in equity markets.

- (2) Purchase of Shares of Multinational Companies:** Without barriers to international trade in securities, investors would have easy access to shares of foreign firms. Thus, they could accomplish “homemade” international portfolio diversification themselves, and the acquisition of foreign securities (or companies) by domestic firms would not provide benefits that investors could not obtain for themselves. Foreign assets and securities would be priced on the same grounds as domestic assets. However, because barriers to foreign investment exist, segmented capital markets could be a source of important advantages to multinational companies (MNCs). In particular, unlike expansion through domestic acquisitions, in many cases foreign acquisitions can add to the value of an MNC. This is because a foreign asset may be acquired at the market value priced in the segmented foreign market. The same asset, when made available to domestic investors, could be valued higher because (a) foreign investors are, on average, more risk averse than domestic investors; and/or (b) the foreign asset is perceived to be less risky (i.e., it has a smaller beta) when evaluated in the context of the domestic (home) capital market. Thus, some of the foreign assets that are priced fairly (have a net present value equal to zero) in the context of the foreign capital market may command a positive net present value in the context of the domestic capital market and, as a result, may add to the wealth of the shareholders of the acquiring firm. It must be noted that this source of advantage has nothing to do with diversification effects per se; it simply involves benefits from arbitrage in markets for risk, i.e. market segmentation. As a rule, companies engaged in international business and foreign operations (MNCs) have better access to foreign firms and securities than domestic investors. This suggests that such companies provide their (domestic) shareholders with the benefits of (indirect) international portfolio diversification. This view can easily lead to simplistic conclusions. However, if domestic investors already hold well-diversified portfolios (the domestic market portfolio), then an MNC provides diversification benefits if and only if new foreign investments expand the accessible investment opportunity set of domestic investors.
- (3) International Mutual Funds:** The easiest and most effective way to implement international portfolio investment, especially for the individual investor, is to invest in “international” mutual funds. Investing in mutual funds solves the problem of the individual investor to obtain information about foreign companies/securities, gain market access and deal with all the problems associated with foreign securities trading. Instead, the fund management company takes care of these issues for all investors of the fund with the benefit of economies of scale due to pooled resources. In return, investors are in most cases charged e.g. through up-front fees for the service of the fund and also the management of the portfolio. These costs to the investor are generally less for funds that replicate a local or international index because they have a simple investment strategy that does not require costly and time-intensive research. One of the important dimensions of mutual funds is whether they are open-end or closed-end. The former in contrast to the latter do not limit the number of shares of the funds, i.e. new investors can always enter the fund and are not constrained by the availability of shares in a secondary market. As a consequence, the capital invested in the fund varies considerably over time. Closed-end funds are typically used with respect to markets that are not very liquid. The closed-end structure isolates the fund manager from the problem of having to buy or sell shares in response to new fund purchases or redemptions. However, this structure leads almost invariably to deviations from net asset values (NAV), i.e. premium or discounts, a phenomenon that has given rise to a substantial literature. Whereas the relationship between premium/market price and NAV often appears to be of a random nature, the existence



of a (positive) premium seems to be rational for those funds specializing in countries which impose significant foreign investor constraints, such as an illiquid market, substantial information gathering costs or other restrictions on market access. If funds provide a means to investors to circumvent these obstacles, they can be expected to trade at a premium. Another puzzling phenomenon of closed-end country funds traded consists in their slow reaction to changes in the fundamental value and their strong correlation with stock market.

8.5.1.5 Measuring the Return and Risk of Foreign Investment

The realised rupee return for an Indian resident investing in a foreign market depends on the return in the foreign currency as well as the change in the exchange rate between the foreign currency and the Indian national rupee (INR). Formally, the rate of return in INR terms from investing in the i^{th} foreign market is as follows:

$$\begin{aligned} R_{i \text{ INR}} &= (1 + R_i) (1 + e_i) - 1 \\ &= R_i + e_i + R_i e_i \end{aligned}$$

Where,

R_i = the foreign currency rate of return in the i^{th} foreign market and

e_i = the rate of change in the exchange rate between the foreign currency and the INR.

e_i will be positive (negative) if the foreign currency appreciates (depreciates) vis-à-vis the INR.

To illustrate, suppose an Indian resident just sold shares of IBM he purchased a year ago and earned a rate of return of 15 percent in terms of the US dollar ($R_i = 0.15$). During the same period the US dollar depreciated 5 percent against the INR ($e_i = -.05$). The realised rate of return in INR terms from this investment is:

$$\begin{aligned} R_{i \text{ INR}} &= (1 + 0.15) (1 - 0.05) - 1 \\ &= 1.0925 - 1 = 0.0925 \text{ or } 9.25 \text{ percent} \end{aligned}$$

The risk of foreign investment, measured in terms of variance, is shown as follows:

$$\text{Var} (R_{i \text{ INR}}) = \text{Var} (R_i) + \text{Var} (e_i) + 2\text{Cov} (R_i, e_i) + \Delta \text{Var}$$

Where,

$\text{Var} (R_i)$ = the variance of foreign currency rate of return,

$\text{Var} (e_i)$ = the variance of the exchange rate change,

$\text{Cov} (R_i, e_i)$ = the covariance between the foreign currency rate of return and the exchange rate change, and

ΔVar = the contribution of the cross- product term, $R_i e_i$, to the risk of the foreign investment.

If the exchange rate remains unchanged, implying that e_i is Zero, only one term, $\text{Var} (R_i)$, remains on the right side, it is clear that exchange rate change contributes to the risk of foreign investment in three ways:

- (1) Its own volatility — $\text{Var} (e_i)$
- (2) Its covariance with the returns in the foreign market — $\text{Cov}(R_i, e_i)$
- (3) Its contribution to the cross- product term — ΔVar

Empirical evidence suggested the following:

- (a) Exchange rate uncertainty contributes more significantly to the risk associated with foreign bond return and less significantly to the risk associated with foreign equity returns.
- (b) Exchange rate changes tend to covary positively with foreign bond returns and interestingly,

negatively with foreign equity returns

- (c) The cross products terms, ΔVar , as expected contributes little to volatility.

8.5.1.6 CAPM and APT

Generally, the capital asset pricing model (CAPM) or the arbitrage pricing theory (APT) is used to estimate expected returns in the international capital market, just as we do for domestic assets. However, these models have to be adapted to the international context.

(1) Capital Asset Pricing Model: For developing a world CAPM, we have to replace the domestic market portfolio with the world market portfolio and measure beta relative to the world market portfolio.

Although such a straightforward generalization of CAPM appears to be reasonable first step, it is characterized by some problems:

- (a) Capital barriers across countries, taxes, and transaction costs may prevent investors from holding a world index portfolio. In fact, some assets may simply be not available to foreign investors.
- (b) Investors in different countries view exchange rate from the point of view of their countries. So, their assessment of the risk characteristics of various securities will differ. Hence, they will not have identical efficient frontiers.
- (c) Consumption baskets of investors in different countries tend to vary. If relative prices of goods change over time, investors in different countries will have different inflation risks.

Due to these problems, the simple CAPM will not work as well in a global context. There is some empirical evidence that assets that are less accessible to foreign investors carry higher risk premiums compared to what a simple CAPM would predict.

(2) Arbitrage Pricing Theory: Compared to CAPM, the APT appears to be more useful in the international context as it can incorporate special risk factors that arise in international investing. Inter alia, the following factors are neutral candidates for inclusion in an APT model for global investing:

- (a) A world stock index
- (b) A national (domestic) stock index
- (c) Currency movement factor
- (d) Industrial sector index

In short with declining barriers to international capital flows and improved communications and data processing technology facilitating low-cost information about foreign securities, investors are showing avid interest in international investing to realize its enormous potentials. Internationally diversified portfolio promises higher returns with less risk than domestically diversified portfolio. The foreign exchange risks of a portfolio or the general portfolio of activities of the MNCs are reduced through international diversification. The extent to which risk is reduced by portfolio diversification depends on how highly the individual assets in the portfolio are correlated. The risk of an individual asset when it is held in a portfolio with a large number of securities depends on its return covariance with other securities in the portfolio and not on its return variance. There are several routes to international security investment such as investing in domestic MNCs, investing in foreign securities in the foreign market, investing in foreign securities in the domestic market, holding depository receipts, investing in mutual funds.

The gains in return-risk efficiency can be improved by hedging the currency risk of foreign investments. Reducing the currency risk of an internationally diversified portfolio can greatly reduce the variability of return without a corresponding decrease in expected return.

8.5.2 International Capital Budgeting

The decision to invest abroad takes a concrete shape when a future project is evaluated in order to ascertain whether the implementation of the project is going to add to the value of the investing



company. The evaluation of the long term investment project is known as capital budgeting. The technique of capital budgeting is almost similar between a domestic company and an international company. The only difference is that some additional complexities appear in the case of international capital budgeting. These complexities influence the computation of the cash flow and the required rate of return.

Capital budgeting evaluates the investment decisions related to assets. The “capital” in capital budgeting refers to the investment of resources in assets, while the budgeting refers to the analysis and assessment of cash inflows and outflows related to the proposed capital investment over a specified period of time. Objectives of capital budgeting is to -

- i. determine whether or not a proposed capital investment will be a profitable one over the specified time period, and,
- ii. to select between investment alternatives.

Capital budgeting at the international level addresses the issues related to:

- i. exchange rate fluctuations capital market segmentation,
- ii. international financing arrangement of capital and related to cost of capital,
- iii. international taxation,
- iv. country risk or political risk etc.

Capital Budgeting: Net Present Value Approach

- The investment decisions of a firm are generally known as the capital budgeting, or capital expenditure decisions.
- Investment Decisions: Expansion, Acquisition, modernisation and replacement
- Investments lead to Exchange of current funds for future benefits.
- The funds are invested in long-term assets so as to create cash inflows over a long period.
- The future benefits will occur to the firm over a series of years.

Three steps are involved in the evaluation of an investment proposal:

- Estimation of cash flows
- Estimation of the required rate of return (the opportunity cost of capital)
- Application of a decision rule for making the choice

Any investment should increase shareholders value. It should recognise the fact that bigger cash flows are preferable to smaller ones and early cash flows are preferable to later ones. It should help to choose among mutually exclusive projects that project which maximises the shareholders' wealth.

- Cash flows of the investment project should be forecasted based on realistic assumptions.
- Appropriate discount rate should be identified to discount the forecasted cash flows. The
- Appropriate discount rate is the project's opportunity cost of capital.
- Present value of cash flows should be calculated using the opportunity cost of capital as the discount rate.
- The project should be accepted if Net Present Value is positive (i.e., $NPV > 0$).

8.5.2.1 Evaluation Criteria:

1. Non-discounting Methods: The methods for evaluating investment proposals are grouped as discounting and non-discounting methods. One such method involves the average accounting rate of return earned by the project. It represents the mean profit on account of investment prior to interest and tax payment. The mean profit is compared with the hurdle rate or required rate of return. The project is acceptable if the mean profit is higher than the hurdle rate. Despite being a simple method, it has some shortcomings, namely, it is based on the accounting income and not on the cash flow; it considers profit before tax, rather than post tax profit, and finally, it ignores the time value.

2. Discounting methods: It takes normally three forms:

(i) Net Present Value (NPV) Method—

Net present value should be found out by subtracting present value of cash outflows from present value of cash inflows.

$$NPV = \left[\frac{CF_1}{(1+k)} + \frac{CF_2}{(1+k)^2} + \frac{CF_3}{(1+k)^3} + \dots + \frac{CF_t}{(1+k)^n} \right] - I_0$$

$$NPV = \sum_{t=1}^n \left(\frac{CF_t}{(1+k)^t} - I_0 \right)$$

Acceptance Rule: NPV: +: Accepted,

NPV: - : Rejected

NPV: 0: May be accepted or rejected

Higher NPV consider for mutually exclusive projects. NPV is most acceptable investment rule for the following reasons:

- Time value of money is recognised by discount rate
- Measure of true profitability
- Shareholders' value maximised

The discount rate used in NPV is the opportunity cost or the WACC

$$K_w = \alpha K_e + K_d(1-\alpha)(1-t)$$

In the above case it is assumed that-

- Business risk of the project is same as the firm's current business risk
- Debt-Equity ratio remains the same throughout the project period.

(ii) Profitability Index (PI) Method: These show the relationship between net cash inflows and initial investments. It shows the relative gains and would be expressed as the following equation:

$$P = \sum_{t=1}^n \frac{CF_t / (1+k)^t}{I_0}$$

(iii) Internal Rate of Return (IRR) Method: IRR is that discount rate that must bring down the value of cash inflows (net) during the life of the project to equate the value of initial investment. Expressed as an equation:

Since the above two assumptions are not true, the discount rate is not valid and hence the process of evaluation is not correct. Hence, in place of NPV, an Adjusted NPV is used with following corrections;

- Project evaluation is carried out with Cost of Equity of the firm
- Present value of any cash flows such as subsidies, external financing etc., would be factored using



special discount rates.

$$\sum_{t=1}^n \left[\frac{E_t}{(1 + IRR)^n} \right] - I_0 = 0$$

8.6 SOURCES OF FOREIGN CURRENCY

Major sources for raising foreign currency finances are as follows :

1. Foreign Currency Term Loan:

Financial Institutions provide Foreign Currency Term Loan for meeting the foreign currency expenditures towards —

- (a) Import of Plant, Machinery and Equipment, and
- (b) Payment of Foreign Technical Know How Fees.

2. Export Credit Schemes:

Export Credit Agencies finance exports of capital goods and related technical services.

Types of Export Credit:

- **Buyer's Credit:** Credit is provided directly to the Indian buyer, for purchase of capital goods and / or technical service from the overseas exporter.
- **Supplier's Credit:** Credit is provided to the overseas exporters, so that they can make available medium-term finance to Indian importers.

Regulatory: These agencies are formed by the Governments of the respective countries and follow certain consensus guidelines for supporting exports, under a convention known as the Berne Union.

3. External Commercial Borrowings(ECB) :

These include raising finance from international markets for plant and machinery imports. Funds can be raised subject to the terms and conditions stipulated by the Government of India, which imposes restrictions on the amount raised under automatic route. Funds raised above the stipulated limit would require the prior approval of the Ministry of Finance.

Types of ECB: External Commercial Borrowings include Bank Loans, Supplier's and Buyer's credit, fixed and floating rate bonds and Borrowing from private sector windows of Multilateral Financial Institutions such as International Finance Corporation.

4. Euro Issues:

Subscription can come from any part of the world except India. This takes the following forms —

- (a) **Depository Receipts Mechanism:** An indirect equity investment, these are issued through Overseas Depository Banks, on behalf of the issuing Company.
- (b) **Foreign Currency/ Euro Convertible Issues:** Euro Convertible Issues is a debt with 'an option to convert it into equity.
- (c) **Debt Route:** Funds can also be raised by way of pure Debt Bonds.

5. Issues in Foreign Domestic Markets:

Capital can also be raised by issuing Exchange Traded instruments in Foreign Markets. These include ADRs, GDRs, etc.

8.6.1 Debt Route

The following are some of the instruments used for borrowing of funds from the international market —

1. **Syndicated Bank Loans:** Borrower should obtain a good credit rating from the rating agencies. Large loans can be obtained in a reasonably short period with few formalities. Duration of the loan is generally 5 to 10 years, interest rate is based on LIBOR Plus spread depending upon the rating.
2. **Foreign Bonds:** These are debt instruments denominated in a currency which is foreign to the borrower and is sold in the country of that currency.

Example: British Firm / Company placing Dollar denominated bonds in USA.

3. **External Commercial Borrowings (ECB's):**

(a) External Commercial borrowings include the following —

- Commercial Bank Loans,
- Buyer's Credit,
- Supplier's Credit,
- Securitized Instruments such as Floating Rate Notes and Fixed Rate Bonds,
- Credit from Official Export Credit Agencies, and
- Commercial Borrowings from multilateral financial institutions like IFCI, ADB, etc.

(b) ECB's are subject to overall ceilings with sub-ceilings fixed by the Government from time to time.

4. **Euro Bonds:** Euro Bonds are debt instruments denominated in a currency issued outside the country of that currency. These are usually bearer bonds and can take the form of- (i) traditional fixed rate bonds, (ii) floating rate of notes (FRN's), (iii) Convertible bonds.

Example: A Rupee Bond floated in France, a Yen Bond floated in Germany.

5. **Euro-bonds with Equity Warrants:** These bonds carry a coupon rate determined by the market rates. The warrants are detachable. Pure bonds are traded at a discount. Fixed income funds may like to invest for the purpose of regular income.
6. **Euro-Convertible Zero Bonds:** These bonds are structured as convertible bonds. No interest is payable on the bonds. But the conversion of bonds takes place on maturity at a pre-determined price. Usually there is a 5 years maturity period and they are treated as a deferred equity issue.
7. **Euro Commercial Papers:** ECP's are short-term money market instruments with a maturity period of less than one year. They are usually designated in US Dollars.

8.6.2 Depository Receipts.

A depository receipt (DR) is a type of negotiable (transferable) financial security that is traded on a local stock exchange but represents a security, usually in the form of equity, that is issued by a foreign publicly listed company. The DR, which is a physical certificate, allows investors to hold shares in equity of other countries. One of the most common types of DRs is the American depository receipt (ADR), which has been offering companies, investors and traders global investment opportunities since the 1920s.

Since then, DRs have spread to other parts of the globe in the form of global depository receipts (GDRs) (the other most common type of DR), European DRs and international DRs. ADRs are typically traded on a U.S. national stock exchange, such as the New York Stock Exchange (NYSE) or the American Stock Exchange, while GDRs are commonly listed on European stock exchanges such as the London Stock Exchange. Both ADRs and GDRs are usually denominated in U.S. dollars, but can also be denominated in euros.



8.6.2.1 How Does the DR Work?

The DR is created when a foreign company wishes to list its already publicly traded shares or debt securities on a foreign stock exchange. Before it can be listed to a particular stock exchange, the company in question will first have to meet certain requirements put forth by the exchange. Initial public offerings, however, can also issue a DR. DRs can be traded publicly or over-the-counter. Let us look at an example of how an ADR is created and traded.

8.6.2.2 Pricing and Cross-Trading

When any DR is traded, the broker will aim to find the best price of the share in question. He or she will therefore compare the U.S. dollar price of the ADR with the U.S. dollar equivalent price of the local share on the domestic market. If the ADR of the Russian gas company is trading at US\$12 per share and the share trading on the Russian market is trading at \$11 per share (converted from Russian rubles to dollars), a broker would aim to buy more local shares from Russia and issue ADRs on the U.S. market. This action then causes the local Russian price and the price of the ADR to reach parity. The continual buying and selling in both markets, however, usually keeps the prices of the ADR and the security on the home market in close range of one another. Because of this minimal price differential, most ADRs are traded by means of intramarket trading.

A U.S. broker may also sell ADRs back into the local Russian market. This is known as cross-border trading. When this happens, an amount of ADRs is canceled by the depository and the local shares are released from the custodian bank and delivered back to the Russian broker who bought them. The Russian broker pays for them in roubles, which are converted into dollars by the U.S. broker.

8.6.2.3 The Benefits of Depositary Receipts

The DR functions as a means to increase global trade, which in turn can help increase not only volumes on local and foreign markets but also the exchange of information, technology, regulatory procedures as well as market transparency. Thus, instead of being faced with impediments to foreign investment, as is often the case in many emerging markets, the DR investor and company can both benefit from investment abroad.

Benefits :

For the Company

A company may opt to issue a DR to obtain greater exposure and raise capital in the world market. Issuing DRs has the added benefit of increasing the share's liquidity while boosting the company's prestige on its local market ("the company is traded internationally"). Depositary receipts encourage an international shareholder base, and provide expatriates living abroad with an easier opportunity to invest in their home countries. Moreover, in many countries, especially those with emerging markets, obstacles often prevent foreign investors from entering the local market. By issuing a DR, a company can still encourage investment from abroad without having to worry about barriers to entry that a foreign investor might face.

For the Investor

Buying into a DR immediately turns an investors' portfolio into a global one. Investors gain the benefits of diversification while trading in their own market under familiar settlement and clearance conditions. More importantly, DR investors will be able to reap the benefits of these usually higher risk, higher return equities, without having to endure the added risks of going directly into foreign markets, which may pose lack of transparency or instability resulting from changing regulatory procedures. It is important to remember that an investor will still bear some foreign-exchange risk, stemming from uncertainties in emerging economies and societies. On the other hand, the investor can also benefit from competitive rates the U.S. dollar and euro have to most foreign currencies.

Giving you the opportunity to add the benefits of foreign investment while bypassing the unnecessary

risks of investing outside your own borders, you may want to consider adding these securities to your portfolio. As with any security, however, investing in ADRs requires an understanding of why they are used, and how they are issued and traded.

8.6.3 American Depositary Receipts

An **American Depositary Receipt (ADR)** is a certificate that represent shares of a foreign stock owned and issued by a U.S. bank. The foreign shares are usually held in custody overseas, but the certificates trade in the U.S. Through this system, a large number of foreign-based companies are actively traded on one of the three major U.S. equity markets (the NYSE, AMEX or Nasdaq).

Example:

Investors can purchase *ADRs* from broker/dealers. These broker/dealers in turn can obtain ADRs for their clients in one of two ways: they can purchase already-issued ADRs on a U.S. exchange, or they can create new ADRs.

To create an ADR, a U.S.-based broker/dealer purchases shares of the issuer in question in the issuer's home market. The U.S. broker/dealer then deposits those shares in a bank in that market. The bank then issues ADRs representing those shares to the broker/dealer's custodian or the broker-dealer itself, which can then apply them to the client's account.

A broker/dealer's decision to create new ADRs is largely based on its opinion of the availability of the shares, the pricing and market for the ADRs, and market conditions.

Broker/dealers don't always start the ADR creation process, but when they do, it is referred to as an unsponsored ADR program (meaning the foreign company itself has no active role in the creation of the ADRs). By contrast, foreign companies that wish to make their shares available to U.S. investors can initiate what are called sponsored ADR programs. Most ADR programs are sponsored, as foreign firms often choose to actively create ADRs in an effort to gain access to American markets.

ADRs are issued and pay dividends in U.S. dollars, making them a good way for domestic investors to own shares of a foreign company without the complications of currency conversion. However, this does not mean ADRs are without currency risk. Rather, the company pays dividends in its native currency and the issuing bank distributes those dividends in dollars -- net of conversion costs and foreign taxes -- to ADR shareholders. When the exchange rate changes, the value of the dividend changes.

For example, let's assume the ADRs of XYZ Company, a French company, pay an annual cash dividend of 3 Euros per share. Let's also assume that the exchange rate between the two currencies is even -- meaning one Euro has an equivalent value to one dollar. XYZ Company's dividend payment would therefore equal \$3 from the perspective of a U.S. investor. However, if the euro were to suddenly decline in value to an exchange rate of one euro per \$0.75, then the dividend payment for ADR investors would effectively fall to \$2.25. The reverse is also true. If the euro were to strengthen to \$1.50, then XYZ Company's annual dividend payment would be worth \$4.50.

ADRs give U.S. investors the ability to easily purchase shares in foreign firms, and they are typically much more convenient and cost effective for domestic investors (versus purchasing stocks in overseas markets). And because many foreign firms are involved in industries and geographical markets where U.S. multinationals don't have a presence, investors can use ADRs to help diversify their portfolios on a much more global scale.



8.6.3.1 Advantages and Limitations:

Advantages	Limitations
(a) Access to Large Capital. (b) Access to Foreign Exchange. (c) No Change in the Shareholding / voting pattern. (d) Increased recognition for the Company internationally by bankers, customers, etc. (e) No Exchange Rate risk since the Company pays interest and dividends in Indian Rupees.	(a) High cost of Issue. (b) Requirement as to large size of issue. (c) Stringent compliance requirements.

8.6.3.2 Process for Raising Equity through ADR:

- (a) **Issue Intermediaries:** ADRs are issued by Overseas Depository Bank (ODB), who have a Domestic Custodian Bank (DCB) in India.
- (b) **Deposit of Securities:** Company willing to raise equity through ADRs should deposit the securities with the DCB in India.
- (c) **Authorization for Issue of ADRs:** The Indian Company authorizes the ODB to issue ADR against the security of Company's Equity Shares.
- (a) **Issue of ADR:** ODB issues ADRs to investors at a predetermined ratio to the Company's securities.
- (d) **Redemption of ADR:** When an investor redeems his ADRs, the appropriate number of underlying equity shares or bonds is released.
- (e) **Dividend / Interest:** The Indian Company pays interest to the ODB, which in turn distributes dividends to the ADR holders based on the prevailing exchange rate.

8.6.3.3 Sponsored ADRs and Unsponsored ADRs

Companies have a choice of four types of Depositary Receipt facilities: unsponsored and three levels of sponsored Depositary Receipts. Unsponsored Depositary Receipts are issued by one or more depositaries in response to market demand, but without a formal agreement with the company. Today, unsponsored Depositary Receipts are considered obsolete and, under most circumstances, are no longer established due to lack of control over the facility and its hidden costs. Sponsored Depositary Receipts are issued by one depositary appointed by the company under a Deposit Agreement or service contract. Sponsored Depositary Receipts offer control over the facility, the flexibility to list on a national exchange in the U.S. and the ability to raise capital.

Sponsored Level I Depositary Receipts

A sponsored Level I Depositary Receipt program is the simplest method for companies to access the U.S. and non-U.S. capital markets. Level I Depositary Receipts are traded in the U.S. over-the-counter ("OTC") market and on some exchanges outside the United States. The company does not have to comply with U.S. Generally Accepted Accounting Principles ("GAAP") or full Securities and Exchange Commission ("SEC") disclosure. Essentially, a Sponsored Level I Depositary Receipt program allows companies to enjoy the benefits of a publicly traded security without changing its current reporting process.

The Sponsored Level I Depositary Receipt market is the fastest growing segment of the Depositary Receipt business. Of the more than 1,600 Depositary Receipt programs currently trading, the vast majority of the sponsored programs are Level I facilities. In addition, because of the benefits investors receive by investing in Depositary Receipts, it is not unusual for a company with a Level I program to obtain 5% to 15% of its shareholder base in Depositary Receipt form. Many well-known multinational companies have established such programs including: Roche Holding, ANZ Bank, South African Brewery, Guinness, Cemex, Jardine Matheson Holding, Dresdner Bank, Mannesmann, RWE, CS Holding, Shiseido, Nestle, Rolls

Royce, and Volkswagen to name a few. In addition, numerous companies such as RTZ, Elf Aquitaine, Glaxo Wellcome, Western Mining, Hanson, Medeva, Bank of Ireland, Astra, Telebrás and Ashanti Gold Fields Company Ltd. started with a Level I program and have upgraded to a Level II (Listing) or Level III (Offering) program.

Sponsored Level II and III Depositary Receipts

Companies that wish to either list their securities on an exchange in the U.S. or raise capital use sponsored Level II or III Depositary Receipts respectively. These types of Depositary Receipts can also be listed on some exchanges outside the United States. Each level requires different SEC registration and reporting, plus adherence to U.S. GAAP. The companies must also meet the listing requirements of the national exchange (New York Stock Exchange, American Stock Exchange) or NASDAQ, whichever it chooses.

Each higher level of Depositary Receipt program generally increases the visibility and attractiveness of the Depositary Receipt.

Private Placement (144A) Depositary Receipt

In addition to the three levels of sponsored Depositary Receipt programs that trade publicly, a company can also access the U.S. and other markets outside the U.S. through a private placement of sponsored Depositary Receipts. Through the private placement of Depositary Receipts, a company can raise capital by placing Depositary Receipts with large institutional investors in the United States, avoiding SEC registration and to non-U.S. investors in reliance on Regulation S. A Level I program can be established alongside a 144A program.

8.6.4 Global Depositary Receipt

These are a class of investment which allows international investors to own shares in foreign companies where the foreign market is hard to access for the retail investor, and without having to worry about foreign currencies and tax treatments. Global Depositary Receipts are issued by international investments banks as certificates (the **GDR**) which represents the foreign shares but which can be traded on the local stock exchange. For example a UK investor may be able to buy shares in a Vietnamese company via a GDR issued by a UK investment. The GDR will be denominated in GB Pounds and will be tradable on the London Stock Exchange. The investment bank takes care of currency exchange, foreign taxes etc. and pays dividends on the GDR in GB Pounds.

The concept originally started in the USA with the creation of American Depositary Receipts which were created so that US retail investors could buy shares in a foreign company without having to worry about foreign exchange, or foreign taxes.

It should be noted that although the risks of owning the foreign shares directly has been removed, there is now a risk of third party default, because the investment bank owns the underlying assets, and may not be able to pass on the benefits to ADR holders if they get into financial difficulty.

Global Depositary Receipts (GDRs) are negotiable certificates issued by depositary banks which represent ownership of a given number of a company's shares which can be listed and traded independently from the underlying shares. These instruments are typically used by companies from emerging markets and marketed to professional investors only.

GDRs can be listed on either the Main Market via a Standard Listing or on the Professional Securities Market. A GDR will be used to access two or more markets, usually London and the US. They are often launched for capital raising purposes, so the US element is generally either a Rule 144(a) ADR or a Level III ADR, depending on whether the issuer aims to tap the private placement or public US markets.

These securities are generally traded in US dollars on the Exchange's Electronic Trading Service the International Order Book (IOB). Associated dividends are paid to investors in US dollars. GDRs are settled in either DTC or Euroclear Bank enhancing their cross border liquidity. The more liquid IOB securities have central counterparty clearing ensuring pre and post trade anonymity as well as mitigation of counterparty risk.



8.6.4.1 Features

- (a) **Underlying Shares:** Each GDR may represent one or more underlying share, which are physically held by the Custodian appointed by the Depository Bank.
- (b) **Entry in Company's Books:** In the Company's books, the Depository Bank's name appears as the holder of the shares.
- (c) **Returns:** Depository gets the dividends from the Company (in local currency) and distributes them to the holders of the Depository Receipts after converting into dollars at the going rate of exchange.
- (d) **Negotiable:** GDRs are exchangeable with the underlying share either at any time, or after the lapse of a particular period of time, generally 45 Days.
- (e) **Globally Marketed:** GDRs are marketed globally without being confined to borders of any market or country as it can be traded in more than one country.
- (f) **Settlement:** GDRs are settled through CEDEL & Euro-Clear International Book Entry Systems.

8.6.4.2 Impact of GDR's on Indian Capital Market

- (a) **Track of Worldwide Events:** Arbitrage possibility in GDR Issues has created additional responsibility on the investors. Investors are now required to keep track of world wide economic events, and how the Company's GDRs are being traded.
- (b) **Free Pricing:** GDR can be issued for any price, and therefore retail investors can longer expect discounted rights or public issues.
- (c) **Flow of Foreign Investment into India:** Since GDRs are sold primarily to institutional investors abroad, it serves as an easy way for flow of huge volume of foreign funds into Indian Capital Market.

8.6.5 Warrants

A warrant is a security that entitles the holder to buy the underlying stock of the issuing company at a fixed exercise price until the expiration date. Some important characteristics to consider include the following:

- A warrant is exercised when the holder informs the issuer of their intention to purchase the shares underlying the warrant.
- A warrant's "premium" represents how much extra you have to pay for your shares when buying them through the warrant as compared to buying them the regular way.
- A warrant's "gearing" is the way to ascertain how much more exposure you have to the underlying shares using the warrant as compared to the exposure you would have if you buy the shares through the market.
- If you plan on exercising the warrant, you must do so before the expiration date. The more time remaining until expiration, the more time for the underlying security to appreciate, which, in turn, will increase the price of the warrant (unless it depreciates). Therefore, the expiration date is the date on which the right to exercise ceases to exist.
- Like options, there are different exercise types associated with warrants such as American style (holder can exercise anytime before expiration) or European style (holder can only exercise on expiration date).

Sometimes, the issuer will try to establish a market for the warrant and to register it with a listed exchange. In this case, the price can be obtained from a stockbroker. Often, though, warrants are privately held or not registered, which makes their prices less obvious.

8.6.5.1 Warrants Versus Other Convertibles

Warrants are very similar to call options. For instance, many warrants confer the same rights as equity options, and warrants often can be traded in secondary markets like options. However, there are several key differences between warrants and equity options:

- Warrants are issued by private parties, typically the corporation on which a warrant is based, rather than a public options exchange.
- Warrants issued by the company itself are dilutive. When the warrant issued by the company is exercised, the company issues new shares of stock, so the number of outstanding shares increases. When a call option is exercised, the owner of the call option receives an existing share from an assigned call writer. Unlike common stock shares outstanding, warrants do not have voting rights.
- Warrants are considered over-the-counter instruments, and thus are usually only traded by financial institutions with the capacity to settle and clear these types of transactions.
- A warrant's lifetime is measured in years (as long as 15 years), while options are typically measured in months. Upon expiration, the warrants are worthless unless the price of the common stock is greater than the exercise price.
- Warrants are not standardized like exchange-listed options. While each option contract is generally over 1,000 underlying ordinary shares, the number of warrants that must be exercised by the holder to buy the underlying asset depends on the conversion ratio set out in the offer documentation for the warrant issue.

8.6.5.2 Valuation

There are various methods of evaluating warrants, the most popular being the Black-Scholes evaluation model. However, it is important to have some understanding of the various influences on warrant prices. The market value of a warrant can be divided into two components:

Intrinsic value: This is simply the difference between the exercise (strike) price and the underlying stock price. Warrants are also referred to as in-the-money or out-of-the-money, depending on where the current asset price is in relation to the warrant's exercise price. Thus, for instance, for call warrants, if the stock price is below the strike price, the warrant has no intrinsic value (only time value - to be explained shortly). If the stock price is above the strike, the warrant has intrinsic value and is said to be in-the-money.

Time value: Time value can be considered as the value of the continuing exposure to the movement in the underlying security that the warrant provides. Time value declines as the expiration of the warrant gets closer. This erosion of time value is called time decay. It is not constant, but increases rapidly towards expiration. Time value is affected by time to expiration, volatility, dividends and interest rates.

Traditional warrants are issued in conjunction with a bond (known as a warrant-linked bond), and represent the right to acquire shares in the entity issuing the bond. In other words, the writer of a traditional warrant is also the issuer of the underlying instrument. Warrants are issued in this way to reduce the interest rate that must be offered in order to sell the bond issue. Valuing this type of warrant can be accomplished with the following equation:

$$P_0 = \left(\sum_{t=1}^T \frac{C}{(1+r)^t} \right) + \frac{F}{(1+r)^T}$$

Where: P is the price paid for the bond with warrants; C is the coupon payment; T is the maturity of the bond; r is the required rate of return; and F is the face value of the bond.

8.6.5.3 Uses, Advantages & Disadvantages

Warrants are often used as deal sweeteners, in order to entice hesitant investors. However, a warrant only benefits the investor if the company grows. Warrants can also be used for portfolio protection. For



example, put warrants allow the owner to protect the value of the owner's portfolio against falls in the market or in particular shares. Because of the dilutive nature of warrants, their issuance can lead to a decrease in stock value and loss of voting control. Warrants may also carry liquidity risk, due to their specialized nature.

8.6.6 Foreign Currency Convertible Bonds (FCCB)

A foreign currency convertible Bond (FCCBs) is a quasi-debt instrument that is issued in a currency other than the issuer's domestic currency. Over the last few years, a majority of Indian Companies issuing FCCBs raised fund in several foreign currency. FCCBs could have a coupon rate of zero but have yield on maturity or FCCBs could also carry lower interest rate and yield on maturity. This is a bullet payment of interest at maturity if the bondholder opts for redemption.

FCCB (Foreign Currency Convertible Bonds) is a bond, issued in a currency different from the issuer's domestic currency. This bond is a mix between the debt and equity instrument and provides the bondholders an option to convert the bonds into equity. This bond gives the issuers an ability to access capital available in foreign markets and make their presence felt in the international market.

FCCB are attractive to both investors and issuers. The investors receive the safety of guaranteed payments on the bond and are also able to take advantage of price appreciation in the company's stock.

8.6.6.1 Features of FCCBs

- FCCB can be either unsecured or secured. But, in practice most of the FCCB issued in India are unsecured.
- FCCB issues have a 'Call' and 'Put' option to suit the structure of the Bond. Both the options are subject to RBI guidelines.
- Public issue of FCCB shall be through reputed lead managers and Private placement is permitted subject to certain conditions.
- It is also possible to issue zero coupon Foreign Currency Convertible Bonds and in this case, the holders of the bond are generally interested to convert the bonds into equity.
- The yield to maturity of FCCB normally ranges 2-7%.
- FCCB are generally listed to stock exchange to increase its liquidity Credit rating of bonds is not mandatory. But, rating can help better marketing of the bonds.
- FCCB Issue related expenses shall not exceed 4% of issue size and in case of private placement, shall not exceed 2% of the issue size.

Interest payable on bonds is also called as coupon rate. The key feature of FCCBs is that the interest is guaranteed and the bondholder also gets the option to convert the bond into equity. The coupon rate is payable at periodic intervals as agreed between the issuer and the bondholder. The holder of FCCBs has the option to convert the bonds into equity within the stipulated timeframe. Thus, FCCBs have the flavour of both debt and equity. If the bondholder opts for conversion, he would receive shares of the issuing company at a redetermined or rather the rate agreed at the time of subscribing to the FCCB issue. This known as the conversion price. The FCCB conversion price is generally at a substantial premium to the market price prevailing at the time of issue.

FCCBs are issued in accordance with the [Scheme for issue of Foreign Currency Convertible Bonds and Ordinary Shares (Through Depository Receipt Mechanism) Scheme, 1993, and subscribed by a non-resident in foreign currency and convertible into ordinary shares of the issuing company in any manner, either in whole, or in part, on the basis of any equity related warrants attached to debt instruments.

8.6.6.2 Disadvantages :

- Exchange risk is more in FCCBs as interest on bond would be payable in foreign currency. Thus companies with low debt equity ratios, large forex earnings potential only opted for FCCBs.
- FCCBs means creation of more debt and a FOREX outgo in terms of interest which is in foreign exchange.
- In case of convertible bond the interest rate is low (around 3 to 4%) but there is exchange risk on interest as well as principal if the bonds are not converted into equity.
- If the stock price plummets, investors will not go for conversion but redemption. So, companies have to refinance to fulfill the redemption promise which can hit earnings.
- It will remain as debt in the balance sheet until conversion.

8.6.7 Euro issues

Until about the mid- eighties, India's external debt was mostly public debt from multilateral institutions like the World Bank, the International Monetary Fund and the Asian Development Bank. Then Indian corporate resorted to commercial borrowings, the bulk of it being in the form of syndicated credit. When the foreign exchange crisis hit the economy in mid – 1990, India's credit ratings plunged below the investment grade and all external funding avenues were closed. This situation continued until 1992. Following economic liberalization, Indian companies started exploring the global market once again. Unlike the earlier period, when syndicated credit was the predominant form of raising external finance, companies began looking at bonds and euro equities, which are collectively referred to as "Euro Issues". The two principal mechanisms used by Indian companies are the Depository receipts mechanism and Foreign Currency Convertible Bonds (FCCBs). The former represents indirect equity investment in the form of Global Depository (GDRs) and American depository receipts (ADRs), while the latter is debt with an option to convert it into equity.

Euro Issues are simply means of raising funds in the international market, and have no special connotation or legal meaning. The term Euro Issue is really a misnomer, as initially these instruments were aimed at the European market, and were listed on either Luxembourg or London Exchanges, but now they have expanded to tap the global market and not just Europe.

8.6.7.1 Advantages of Euro Issues

There are several advantages for companies to issue Eurobonds:

- Obtaining financing by issuing Eurobonds is often cheaper than obtaining a foreign currency bank loan.
- It is a way for companies to obtain financing in an economy where financing is hard to obtain. Issuing Eurobonds gives companies wider access to the international market which they may normally not be able to access.
- It gives companies the ability to raise funds without having to issue shares.
- Since Eurobonds are normally aimed at institutional investors and not the public, there are no advertisement costs involved and this therefore means lower costs for the issuing firm.
- Allows companies to obtain funds in a foreign currency to create a foreign currency liability to match against a foreign currency asset.

8.6.7.2 Disadvantages of Euro Issues

Against these advantages, there are some disadvantages to consider:

- there are issue costs to take into account
- if the debt is not matched against a foreign currency asset, the Eurobond issuing firm may be open to foreign exchange risk.



There are several benefits to an investor who does put its money into Eurobonds":

- The bonds give an investor a possibility of achieving a higher yield on investments as compare to investing in most shares, bank and building society accounts, money market placements, etc.
- It is a "safe" investment in the sense that the full value of the bond will be repayed when the bond matures.

As for disadvantages to the investor:

- Investing in a Eurobond is not a good idea for investors who may need a repayment of the investment at short notice.
- There is always the risk of the issuing company going under and the maturity value of the Eurobond not being paid.

8.6.8 Euro Commercial Paper

Euro Commercial Papers are short term paper issued by non-bank borrowers. The principal distinguishing feature is that Commercial Papers are not underwritten by a bank and the issuer, therefore, is one with very high credentials. The paper is usually issued in higher denominations of the order of \$ 1,00,000 and the market is dominated by large professional investors. Although Euro Commercial Papers can be issued in interest bearing form, they are usually issued at a discount to face value and quoted in the secondary market on a yield basis.

8.6.9 Euro Convertible Bond (ECB)

Euro Convertible Bonds are quasi debt securities (unsecured) which can be converted into Depository Receipts or local shares at a fixed price after the minimum lock-in period. Price of Equity Shares at the time of conversion will have a premium element. Bonds carry a fixed rate of interest, and the payment of interest is made in US Dollars.

Issue of these Bonds carry options —

Call Option: Right to the Company to convert the ECB into Equity before maturity. Pre-Mature conversion is generally done, when the market price of the shares exceeds a particular percentage of the conversion price.

Put Option: Put Option allows the investors to get his money back before maturity.

Prior Government Approval: Company desirous of issuing ECB, should obtain the prior permission of Ministry' of Economic Affairs. Certain restrictions are imposed on the eligibility norms such as good financial track record, nature of industry etc.

Proceeds of ECBs can be applied only for the following —

- (a) Import of Capital Goods,
- (b) Retiring Foreign Currency Debts,
- (c) Capitalizing Indian Joint Venture Abroad,
- (d) Application for Working Capital and Others is restricted to 25% of total proceeds.

8.6.10 "Note Issuance Facility"

Note-Issuance-Facility (NIF) is a Medium-Term Commitment on the part of underwriting banks which obliges them to purchase any short term notes which the borrower is unable to sell in the market, at an agreed spread over a suitable benchmark (Example: LIBOR).

8.6.10.1 Advantages:

- **Reduced Cost of Borrowing:** Borrower can sell notes at a spread lower than that at which the underwriters are committed to buy, thereby reducing the cost of borrowing.

- **Access to Large Number of Investors:** Note Issuance Facility is a short term facility and therefore, therefore, majority of investors, who are not interested in Long Term Investments, would find this as an good short term investment.

8.6.11 Participating Notes

Participatory Notes -- or P-Notes or PNs -- are instruments issued by registered foreign institutional investors to overseas investors, who wish to invest in the Indian stock markets without registering themselves with the market regulator, the Securities and Exchange Board of India.

Financial instruments used by **hedge funds** that are not registered with Sebi to invest in Indian securities. Indian-based brokerages to buy India-based securities / stocks and then issue participatory notes to foreign investors. Any dividends or capital gains collected from the underlying securities go back to the investor.

Since international access to the Indian capital market is limited to FIIs. The market has found a way to circumvent this by creating the device called participatory notes, which are said to account for half the \$80 billion that stands to the credit of FIIs. Investing through P-Notes is very simple and hence very popular.

Hedge funds, which invest through participatory notes, borrow money cheaply from Western markets and invest these funds into stocks in emerging markets. This gives them double benefit: a chance to make a killing in a stock market where stocks are on the rise; and a chance to make the most of the rising value of the local currency.

P-Notes are issued to the real investors on the basis of stocks purchased by the FII. The registered FII looks after all the transactions, which appear as proprietary trades in its books. It is not obligatory for the FIIs to disclose their client details to the SEBI, unless asked specifically.

8.6.11.1 Who Can Invest in P-Notes?

- a) Any entity incorporated in a jurisdiction that requires filing of constitutional and/or other documents with a registrar of companies or comparable regulatory agency or body under the applicable companies legislation in that jurisdiction;
- b) Any entity that is regulated, authorised or supervised by a central bank, such as the Bank of England , the Federal Reserve, the Hong Kong Monetary Authority, the Monetary Authority of Singapore or any other similar body provided that the entity must not only be authorised but also be regulated by the aforesaid regulatory bodies;
- c) Any entity that is regulated, authorised or supervised by a securities or futures commission, such as the Financial Services Authority (UK), the Securities and Exchange Commission, the Commodities Futures Trading Commission, the Securities and Futures Commission (Hong Kong or Taiwan), Australia Securities and Investments Commission (Australia) or other securities or futures authority or commission in any country, state or territory;
- d) Any entity that is a member of securities or futures exchanges such as the New York Stock Exchange (Sub-account), London Stock Exchange (UK), Tokyo Stock Exchange (Japan), NASD (Sub-account) or other similar self-regulatory securities or futures authority or commission within any country, state or territory provided that the aforesaid organizations which are in the nature of self regulatory organizations are ultimately accountable to the respective securities / financial market regulators.
- e) Any individual or entity (such as fund, trust, collective investment scheme, Investment Company or limited partnership) whose investment advisory function is managed by an entity satisfying the criteria of (a), (b), (c) or (d) above.



8.7 FOREIGN INVESTMENT IN INDIA

Foreign investments in the country can take the form of investments in listed companies (i.e., FII investments), investments in listed/unlisted companies other than through stock exchanges (i.e., through the foreign direct investment or private equity/foreign venture capital investment route), investments through American Depository Receipts/Global Depository Receipts (ADR/GDR), or investments by non-resident Indians (NRIs) and Persons of Indian Origin (PIOs) in various Forms.

The fast and steadily growing economy of India in majority of its sectors, has made India one of the most famous and popular destinations in the whole world, for Foreign Direct Investment. India's ever-expanding markets, liberalization of trade policies, development in technology and telecommunication, and loosening of diverse **foreign investment restrictions**, have further collectively made India, the apple of investors' eye, for most productive, profitable, and secure foreign investment. According to a recent survey by the United Nations Conference on Trade and Development (UNCTAD), India has conspicuously emerged out as the second most popular and preferable destination in the entire world, after China, for highly profitable foreign direct investment.

In recent years, bulk of the **foreign direct investment in Indian business sectors** of infrastructure, telecommunication, information technology, computer hardware and software, and hospitality services, have been made by investors of countries like US, UK, Mauritius, Singapore, and many others.

The **foreign direct investment** in Indian business sectors, can easily be made in a variety of ways, through the Governmental and Automatic Routes. However, the Joint Ventures are the most popular and preferred forms of making investment in Indian industry. At present, the most lucrative business sectors for FDI in India are, Infrastructure (Power, Steel, Railways, etc.); Telecommunications; Hospitality sector; Education; Retail; Real Estate; Retail sector, Petroleum and Petroleum Products; Biotechnology; Alternative Energy, etc.

8.7.1 Joint Venture

As business projects get larger, technology more expensive, and the costs of failure too large to be borne alone, businesses feel the need to work with joint ventures. In general, a joint venture ("JV") is an association of two or more entities (whether corporate, government, individual or otherwise) combining property and expertise to carry out a single business enterprise and having a joint proprietary interest, a joint right to control and a sharing of profits and losses. Regardless of the scope of the undertaking, the nature of the JV or the respective degrees of equity or management involvement, a JV must: (1) be a separately identifiable entity; (2) have an ownership interest in such entity by each joint venture partner ("JVP"); and (3) have an active management involvement or deliberate rejection of the right to such involvement by each JVP.

In increasing numbers, businesses have been reaching beyond national boundaries in an effort to locate new opportunities for growth, new markets, and new venture capital. Each foreign market offers unique opportunities and risks, and many firms naturally look to JVs with one or more partners for assistance in entering new markets. JVs have become a major feature of the international business landscape due to increased global competitiveness and technological innovation.

JVs are common and successful in several industries. For example, in the land development and construction industries, JVs are often used to obtain sufficient financing to acquire large land tracts or to undertake major building projects. JVs are also common in the manufacturing, mining, and service industries. A JV may be formed to conduct research and development work on a new product or technical application, to manufacture or produce various products, to market and distribute products and services in a specified geographic area, or to perform a combination of these functions. The function of the JV will be linked to the overall objectives of the parties and will dictate to a large extent the substantive terms of the JV arrangement.

The formation of a JV can be a complex process. After a compatible JVP is selected, the specific goals of the enterprise must be defined, the structure of the JV must be negotiated, numerous legal issues must be recognized and resolved, and potential areas of conflict between the JVPs must be identified and reconciled. If the JV is formed under the laws of a country other than the United States, the JVPs must take the time to understand the requirements of the foreign country's corporate law.

8.7.1.1 Reasons for Forming a Joint Venture

There are many motivations that lead to the formation of a JV. They include:

- **Risk Sharing** – Risk sharing is a common reason to form a JV, particularly, in highly capital intensive industries and in industries where the high costs of product development equal a high likelihood of failure of any particular product.
- **Economies of Scale** – If an industry has high fixed costs, a JV with a larger company can provide the economies of scale necessary to compete globally and can be an effective way by which two companies can pool resources and achieve critical mass.
- **Market Access** – For companies that lack a basic understanding of customers and the relationship/infrastructure to distribute their products to customers, forming a JV with the right partner can provide instant access to established, efficient and effective distribution channels and receptive customer bases. This is important to a company because creating new distribution channels and identifying new customer bases can be extremely difficult, time consuming and expensive activities.
- **Geographical Constraints** – When there is an attractive business opportunity in a foreign market, partnering with a local company is attractive to a foreign company because penetrating a foreign market can be difficult both because of a lack of experience in such market and local barriers to foreign-owned or foreign-controlled companies.
- **Funding Constraints** – When a company is confronted with high up-front development costs, finding the right JVP can provide necessary financing and credibility with third parties.
- **Acquisition Barriers; Prelude to Acquisition** – When a company wants to acquire another but cannot due to cost, size, or geographical restrictions or legal barriers, teaming up with a JVP is an attractive option. The JV is substantially less costly and thus less risky than complete acquisitions, and is sometimes used as a first step to a complete acquisition with the JVP. Such an arrangement allows the purchaser the flexibility to cut its losses if the investment proves less fruitful than anticipated or to acquire the remainder of the company under certain circumstances.

8.7.1.2 Basic Elements of a Joint Venture

- **Contractual Agreement.** JVs are established by express contracts that consist of one or more agreements involving two or more individuals or organizations and that are entered into for a specific business purpose.
- **Specific Limited Purpose and Duration.** JVs are formed for a specific business objective and can have a limited life span or be long-term. JVs are frequently established for a limited duration because (a) the complementary activities involve a limited amount of assets; (b) the complementary assets have only a limited service life; and/or (c) the complementary production activities will be of only limited efficacy.
- **Joint Property Interest.** Each JV participant contributes property, cash, or other assets and organizational capital for the pursuit of a common and specific business purpose. Thus, a JV is not merely a contractual relationship, but rather the contributions are made to a newly-formed business enterprise, usually a corporation, limited liability company, or partnership. As such, the participants acquire a joint property interest in the assets and subject matter of the JV.



- **Common Financial and Intangible Goals and Objectives.** The JV participants share a common expectation regarding the nature and amount of the expected financial and intangible goals and objectives of the JV. The goals and objectives of a JV tend to be narrowly focused, recognizing that the assets deployed by each participant represent only a portion of the overall resource base.
- **Shared Profits, Losses, Management, and Control.** The JV participants share in the specific and identifiable financial and intangible profits and losses, as well as in certain elements of the management and control of the JV.

8.7.1.3 Structuring the Joint Venture

Structuring any JV may pose a challenge. This is especially true where parties are from different jurisdictions and various cultural backgrounds are involved. After parties have decided on fundamental issues such as the commercial nature, scope and mutual objectives of the joint venture, the JVPs must determine the geographic location of the venture and what form or legal structure the joint venture will take.

Generally, the structure chosen will be between different types of partnerships, corporations, or some form of a limited liability company, depending on the tax and tort liability each JVP wants to be exposed to. The precise tax and legal features of vehicles of the same general type will vary from one country to another, but the U.S. forms of businesses can be broadly classified as follows:

- **Corporations** – Corporations are a commonly preferred choice for JVs. The legal status of a corporation is clear, and its ability to own assets, incur liabilities and enter into legally binding contracts is obvious to third parties. The liability of shareholders for the corporation's debts and obligations is limited to their capital investment in the corporation, something that is not always the case with other entities. From a tax perspective, corporations may be undesirable because they generally lack pass-through tax status, making its shareholders unable to set off profits and losses generated by the JV against income or expenses from other activities. Also, the net income of a corporation is likely to be subject to corporate tax in the jurisdiction it is located, be it in the U.S. or elsewhere. Such tax payable by the corporation may not be credible against taxes payable on dividends and other profit distribution from the corporation and its shareholders. However, the presence or absence of tax treaties between respective countries may still make the corporation profitable.
- **General Partnerships** – All partners in a general partnership have personal liability for debts and other obligations incurred by the partnership. One advantage of a general partnership in the U.S. and many other countries is that normally no income or franchise tax is imposed on it. Also, all partners can act on behalf of, and legally bind, the partnership via third parties.
- **Limited Partnerships** – Under a limited partnership there are two distinct types of partners, general and limited. The general partner carries responsibilities similar to the one he carries in a general partnership, including the ability to legally bind the whole partnership and being personally liable for debts and obligations of the partnership. The limited partner, on the other hand, mainly contributes capital and receives a specified share of the profits. The limited partner is excluded from active management of the partnership, but is exempt from personal liability for debts and obligations of the partnership.
- **Limited Liability Company** – A limited liability company is a hybrid between the partnership and the corporation in that it provides the JVPs with insulation from the liabilities of the LLC as in a corporation, while generally being classified as a partnership for U.S. tax purposes. All members may take part in management. Hybrid vehicles such as the LLC are not recognized in all parts of the world.

8.7.1.4 Managing the Joint Venture

Some JVs are *dominant parent* enterprises – projects are managed by one parent like wholly owned subsidiaries. The dominant parent selects all the functional managers for the enterprise. The board of directors, although made up of executives from each parent, plays a largely ceremonial role as the dominant parent executives make all the venture's operating and strategic decisions. Having managers from only one parent can lead to frustrations for the managers as well as parent company executives.

A dominant parent enterprise is appropriate where a JVP is chosen for reasons other than managerial input – i.e., financial backing, access to resources, patents, or because it consumes a large amount of the product to be made. Dominant parent joint ventures are also appropriate when a company takes on a partner solely in response to pressures from a host government. In such situations, a foreign company often prefers to find a passive local company that (1) has no knowledge of the product, (2) is willing to be a passive investor, and (3) is neither a government agency nor controlled by the government. The passive partner, who may be supplying technology or money, must trust the competence and honesty of the dominant parent. If the local partner never learns the business of the JV, the dominant parent's bargaining position with the host government will remain strong.

Other JVs are *shared management* ventures, where both parents manage the enterprise. Each parent supplies both functional managers and executives to serve on the board of directors. Here, the board of directors has a real decision-making function.

One type of shared management venture is the 50:50 JV. This type of JV is characterized by 50:50 participation in which each partner contributes 50 percent of the equity in return for 50 percent participating control. Under such participation, each JVP is equally at risk, and is not subservient to the other JVP as would be the case where majority control is vested in one party. This sharing of interest and control also raises the possibility of deadlock during disputes and early termination of the JV.

It is important to note that not all shared management ventures own equal shares. JVs are flexible so that they can be structured in such a way that one JVP has more than a co-equal role in the JV (e.g., 40/60).

Shared management is critical in ventures where both JVPs are needed for managerial input, as in manufacturing situations where one parent is supplying technology and the other knowledge of the local market. However, deteriorating performance in a shared management venture obliges each parent to become more involved in the operation of the venture. Unless either parent is willing to defer to the other's knowledge or expertise, the decision-making process can become slow, confused and trigger a series of events that can lead to the destruction of the venture.

Because the amount and type of help needed from a partner may change over time, some companies opt to begin their venture under a shared management that they can later convert to a dominant venture. However, once both parents have become accustomed to operating the venture, such transitions become difficult to make.

The high failure rate of shared management ventures suggests that dominant ventures outperform shared management ventures. Since shared management ventures are not consistently used for riskier business tasks, their high failure rate is a strong indication that they are more difficult to operate than dominant parent ventures. Parents of the venture may, and often do, disagree over strategic and organizational decisions. Differences in the parent venture's priorities, direction, and perhaps values result in confusion, frustration, and slowness in the decision-making process and may place a joint venture at a distinct competitive disadvantage. As a result, if a partner is chosen for reasons other than managerial input a dominant parent structure will usually be best.

Majority ownership and dominance of a joint venture do not always go hand in hand. A parent holding only 24% of one venture's shares may be its exclusive manager. Similarly, one parent may dominate a venture, despite the fact that it is a 50-50 deal.



8.7.1.5 Termination of Joint Ventures

Any number of events may lead to the termination of a JV. Many termination events are anticipated and provided for in the joint venture agreement. For example, a breach of the joint venture agreement may trigger termination, as will other events, such as failure to meet research and development deadlines. A JV may terminate upon achieving its objectives. Alternatively, a JV may terminate upon failing to meet its objectives. The agreement could provide that one JVP buy the other out or sell its shares, or vice versa.

Excessive costs, failure to achieve projected income, or unforeseen capital requirements may make the continuation of a JV unattractive. In addition, a change in the JV's objectives or those of a shareholder may also lead to the early termination of the JV. Changes in objectives may result from a JVP's internal strategic redirection, competitive advances, or market changes beyond the control of the JV or its shareholders. Disagreement by JVPs on fundamental management issues may also lead to termination.

An obvious disadvantage of sharing capital obligations is the need to share profits generated from the actual operation of the JV. Issues can arise in this area not so much because of the cash contributed, but because of the fact that the parties will also be contributing intangible assets to the business, such as intellectual property rights and technical expertise. Technology and management sharing can potentially create significant problems among the parties. In particular, one party's mastery of the other's technology can lead to improvements on that technology beyond the intended services of the JV, a factor that tends to discourage companies from disclosing their technologies for fear of losing the competitive edge to their JVP.

Many commentators argue that JVs offer a structure for reducing the "free riding" of the local JV partner because both partners contribute to the costs associated with the exploitation of the technology in proportion to their expected benefits. The theory is that a JV partner will have an incentive to focus on protecting the results of the JV activities rather than trying to replicate independently the results for its own account.

8.7.2 Foreign Technology

The most important consideration for obtaining Foreign Technology is with reference to the manner of payment of consideration to the person giving the Foreign Technology. It can take the following forms —

(A) One Time Lumpsum Payment:

- Amount will become certain.
- Amount can be discounted forward and will be less.
- Forex exposure risk is avoided.
- Provides an opportunity to reduce per unit cost of technology by maximizing sales.

(B) Periodic Payments in the form of Royalty:

- Ensures that the sales benefit is realized before technology payment accrues.
- Provides easy installments for funding.

8.7.2.1 Tax issues:

If it is a lump sum upfront payment, tax also could be certain; whereas, in protracted royalty payment, there is a chance of tax uncertainty. It would be advisable for the payer to obtain beforehand expert opinion as to how to plan its tax shield in the best manner possible.

8.7.2.2 Government Clearance:

Automatic permission will be given for foreign technology agreements up to certain limits. The conditions to be satisfied for obtaining Government permission should also be considered.

8.8 TAXATION ISSUES IN CROSS-BORDER FINANCING AND INVESTMENT

India is a federal republic, with 28 states and seven federally administered union territories; it operates a multi-party parliamentary democracy system. It is a common law country with a written constitution. Parliament has two houses: the Lok Sabha (lower house) and the Rajya Sabha (upper house). The President, the constitutional head of the country and of the armed forces, acts and discharges the constitutional duties on the advice of the Council of Ministers, which is headed by the Prime Minister. The Prime Minister and the Council of Ministers are responsible to parliament and subject to the control of the majority members of parliament. The states and union territories are governed by independently elected governments.

India is a three-tier economy, comprising a globally competitive services sector, a manufacturing sector and an agricultural sector. The services sector has proved to be the most dynamic in recent years, with trade, hotels, transport, telecommunications and information technology, financial, and business services registering particularly rapid growth.

Price controls

The central and state governments have passed legislation to control production, supply, distribution and the price of certain commodities. The central government is empowered to list any class of commodity as essential and can regulate or prohibit the production, supply, distribution, price and trade of these commodities for the following purposes: maintain or increase supply; equitable distribution and availability at fair prices; and secure an essential commodity for the defense of India or the efficient conduct of military operations.

Intellectual property

Indian legislation covers patents, copyrights, trademarks, geographical indicators and industrial designs. The Patent Act 1970 has been amended several times to meet India's commitments to the WTO, such as increasing the term of a patent to 20 years.

Trademarks can be registered under the Trade Marks Act, 1999, which provides for registration of trademark for services in addition to goods, simplifies procedures, increases the registration period to 10 years and provides a six-month grace period for the payment of renewal fees.

Copyrights are protected on published and unpublished literary, dramatic, musical, artistic and film works under the Copyright Act 1957. Subsequent amendments have extended protection to other products, such as computer software and improved protection of literary and artistic works and established better enforcement. The protection term for copyrights and rights of performers and producers of phonograms is 50 years.

India is a signatory to the Paris Convention for the Protection of Industrial Property and the Patent Co-operation Treaty, and it extends reciprocal property arrangements to all countries party to the convention. The convention makes India eligible for the Trademark Law Treaty and the Madrid Agreement on Trademarks. The country also participates in the Bern Convention on Copyrights, the Washington Treaty on Layout of Integrated Circuits, the Budapest Treaty on Deposit of Micro-organisms and the Lisbon Treaty on Geographical Indicators.

As a member of the WTO, India enacted the Geographical Indications of Goods (Registration & Protection) Act (1999).

Currency

The currency is the Indian rupee (INR).

Banking and financing

India's central bank is the Reserve Bank of India (RBI), which is the supervisory authority for all banking operations in the country. The RBI is the umbrella network for numerous activities, all related to the



nation's financial sector, encompassing and extending beyond the functions of a typical central bank. The primary activities of the RBI include:

- Monetary authority;
- Issuer of currency;
- Banker and debt manager to the government;
- Banker to banks;
- Regulator of the banking system;
- Manager of foreign exchange; and
- Regulator and supervisor of the payment and settlement systems.

The RBI formulates implements and monitors the monetary policy. It is responsible for regulating non-banking financial services companies, which operate like banks but are otherwise not permitted to carry on the business of banking.

The banking sector in India is broadly represented by public sector banks (where the government owns a majority shareholding and includes the State Bank of India and its subsidiaries); private sector banks; foreign banks operating in India through their branches/wholly owned subsidiaries; and regional rural bank and co-operative banks, which usually are regional.

The RBI has released draft guidelines for the licensing of new banks in the private sector.

Stringent rules govern the operations of systemically important non-deposit taking non-banking financial services companies, such as those with assets of INR 1 billion or more, to reduce the scope of regulatory arbitrage vis-à-vis a bank.

The financial and commercial center in India is Mumbai, and there are proposals to develop this area further as an International Financial Center.

8.8.1 Principal Drivers of Investment in India

Some of the principal drivers of investment in India include:

- English speaking country
- Democratic regime
- Young and educated workforce
- Competitive wages
- Increasing urbanization
- Expanding middle class with rising household income
- Growing consumer markets
- Increasingly organized businesses
- Investment in infrastructure
- Common law jurisdiction – all commercial laws in English

8.8.2 Three Routes for Investing in India

There are three principal avenues for investing in India:

- Through a Foreign Direct Investment (FDI)
- As a Foreign Institutional Investor (FII)
- As a Foreign Venture Capital Investor (FVCI)

(i) Foreign investment

Many foreign companies use a combination of exporting, licensing and direct investment in India. India permits 100% foreign equity in most industries. Units setting up in special economic zones (SEZs), operating in electronic hardware or software technology parks or operating as 100% export-oriented units also may be fully foreign-owned. Nevertheless, the government has set sector-specific caps on foreign equity in certain industries, such as basic and cellular telecommunications services, banking, civil aviation and retail trading.

Foreign direct investment is made through two routes: automatic approval and government approval:

Automatic Route: Foreign investors or an Indian company do not need the approval of the government or the RBI. The recipient (Indian company) simply must notify the RBI of the investment and submit specified documents to the RBI through an authorized dealer. Where there are sector-specific caps for investment, proposals for stakes up to those caps are automatically approved, with a few exceptions. Foreign direct investment (including the establishment of wholly owned subsidiaries) is allowed under the automatic route in all sectors, except those specifically listed as requiring government approval. The government has established norms for indirect foreign investment in Indian companies, according to which an investment by a foreign company through a company in India that is owned and/or controlled by a nonresident entity would be considered as foreign investment.

Approval Route: Proposed investments that do not qualify for automatic approval must be submitted to the Foreign Investment Promotion Board (FIPB); areas where FIPB approval is required include asset reconstruction, commodity exchange, courier service, defense, print media, etc.

Investment in certain sectors is prohibited even under the approval route. Examples of prohibited investment sectors include agriculture (subject to conditions), retail trading (except single brand retail), lotteries, the manufacturing of cigarettes, the real estate business, atomic energy and railway transport.

The Secretariat for Industrial Assistance (SIA), which operates within the Ministry of Commerce and Industry, issues industrial licenses, provides information and assistance to companies and investments, monitors delays and reports all government policy relating to foreign investment and technology. Investors may submit a package application covering both the license and the foreign investment with the SIA or the FIPB. Normal processing time is up to three months.

Overseas investors such as financial institutional investors (FIIs) and foreign venture capital investors (FVCIs) are permitted to invest in Indian capital markets. FIIs must register with the SEBI and FVCIs require the approval of the RBI, followed by registration with SEBI.

(ii) Tax Considerations for Indian Investment Funds

- India levels tax on capital gains from direct or indirect sales of shares of Indian companies by non-residents
- Funds investing in India must be organized in a jurisdiction that has a double-taxation avoidance agreement (DTAA) with India in order to achieve tax efficiency
- Jurisdictions with favorable DTAA's include Mauritius, Cyprus and Singapore, all of which generally provide that tax residents of such jurisdictions are exempt from the Indian capital gains tax and do not impose any local tax on such capital gains
- Dividends and interest may be subject to local tax at varying rates, subject to available foreign tax credits

Tax incentives

India's investment incentives are designed to channel investments to specific industries, promote the development of economically lagging regions and encourage exports. The country offers a number of benefits, including tax and non-tax incentives for establishing new industrial undertakings; incentives for specific industries such as power, ports, highways, electronics and software; incentives for units in less-



developed regions; and incentives for units producing exports or in export processing zones and SEZs.

Incentives include the following:

- Tax holidays, depending on the industry and region;
- Weighted deductions at 200% for in-house research and development (R&D) expenses, including capital outlays (other than those for land) in the year incurred. Companies also can claim a deduction for expenses incurred in the three years immediately preceding the year in which the company commenced business; and
- Accelerated depreciation for certain categories, such as energy saving, environmental protection and pollution control equipment.

The central government's development banks and the state industrial development banks extend medium- and long-term loans and sometimes take equity in new projects. Some Indian states provide additional incentives.

(iii) Exchange controls

The government sets India's exchange control policy in conjunction with the RBI, which administers foreign exchange (forex) regulations. The Foreign Exchange Management Act, 1999 (FEMA) established a simplified regulatory regime for forex transactions and liberalized capital account transactions. The RBI is the sole monitor of all capital account transactions.

The rupee is fully convertible on the current account and forex activities are permitted unless specifically prohibited.

The RBI allows branches of foreign companies operating in India to freely remit net-of-tax profits to their head offices through authorized forex dealers, subject to RBI guidelines.

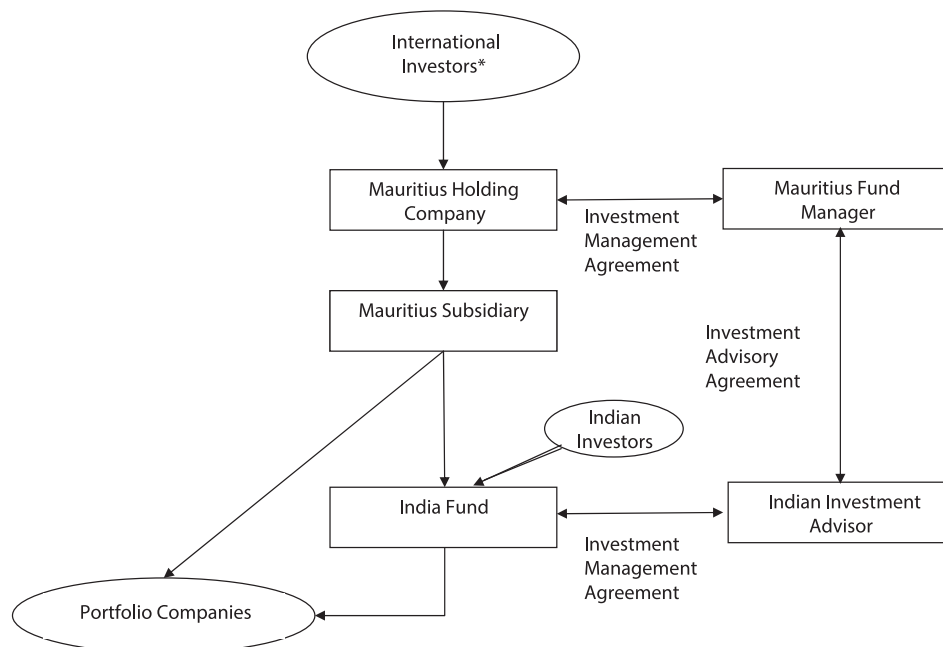
8.8.3 INDIA Comparison of Jurisdictions with Favorable DTAA's

	Mauritius	Cyprus	Singapore
Indian tax payable on capital gains from sale of shares in Indian companies	Mauritius tax residents are exempt	Cyprus tax residents are exempt	Singapore tax residents are exempt, subject to certain conditions
Indian tax payable on interest received from Indian companies	20 percent (foreign currency borrowing/40 percent (Indian rupee borrowing)	10 percent	15 percent
Local tax on capital gains from the sale of shares in Indian companies	None	None	Generally none
Local tax on interest received from Indian companies	None for a business holding a global business license category use	10 percent	17 percent, however foreign tax Credit may be available
Local tax on dividends received from Indian companies	None to 3 percent, subject to foreign tax credit in Mauritius	None, subject to foreign tax credit in Cyprus. Special defence contribution tax may be applicable in some circumstances	None, depending on circumstances of investment and possible foreign tax credit

Length of time needed to incorporate a company	Four to six weeks to assemble investor's due diligence information	EU membership	Clear-cut (albeit strict) process for establishing tax residency
Other advantages	• Strength in numbers; Mauritius is India's largest investor • Clarity in the process for establishing tax residency • Mauritius tax residency supported by legal precedent in India • Any amendment to the DTAA will face fierce opposition • Flexible corporate laws which offer both common law and civil law concepts		International financial center with world-class business advisory services
Disadvantages	Time-consuming to assemble investor's due diligence information for corporate formation purposes	• Ambiguity in the process for establishing tax residency • DTAA may be vulnerable to changes • Slow incorporation process • Rigid corporate laws	• Capital gains exemption does not apply if the company was formed with the "primary purpose" of taking advantage of this exemption • Capital gains exemption will end if India and Mauritius take away the corresponding exemption from their DTAA • Strict requirements for establishing tax residency



8.8.4 Structuring Indian Investment Funds



Structuring Indian Investment Funds

Additional structural considerations:

- Imposition of Cayman or other offshore vehicles above the Mauritius holding company
 - Allows traditional private equity partnership terms to be used in lieu of shareholders agreement for Mauritius company
 - May also be used as a “blocker corporation” to block unrelated business taxable income (“UBTI”) from UBTI- sensitive investors (e.g., tax-exempts)
 - One or more additional vehicles above the Mauritius holding company may be used to accommodate special terms or legal or tax considerations applicable to specific investors

Recent Regulatory Developments Affecting Indian Investment Funds

- Passage of Dodd-Frank means increased registration of U.S. and foreign investment advisers
- OECD recognition of Cayman Islands on its “white list” of jurisdictions employing internationally recognized tax standards may increase investment through Cayman vehicles
- Choice of jurisdiction:
 - Mauritius, Singapore, Cyprus, Netherlands;
 - Future of treaty jurisdictions - proposed new law – GAAR.

8.8.5 Setting Up a Business

(i) Principal forms of business entity

The principal forms of doing business in India are the limited liability company (public company or private company); limited liability partnership (LLP); partnership firm; association of persons; representative office, branch office, project office or site office of a foreign company; and trust. Foreign investors may adopt any recognized form of business enterprise. The limited liability company is the most widely used and the most suitable form for a foreign direct investor. Joint ventures also are popular.

The formation, management and dissolution of limited liability companies is governed by the Companies Act 1956 (Companies Act), which is administered by the Ministry of Corporate Affairs (MCA) through the Registrar of Companies (ROC), Regional Director, Company Law Board and Official Liquidator.

Formalities for setting up a company

A foreign company can commence operations in India by incorporating a company under the Companies Act as a subsidiary (including a wholly owned subsidiary) or as a joint venture company.

Private or public companies are formed by first obtaining name availability approval, followed by registering the memorandum and articles of association and prescribed forms with the Registrar of Companies (ROC) in the state in which the registered office is to be located. If the documents are in order, the ROC will issue a certificate of incorporation. The filing for company formation is made in electronic form. A private company can commence its business immediately upon incorporation. A public company is required to obtain a Certificate of Commencement of Business from the ROC before starting its business operations.

All directors or proposed directors must obtain a Director Identification Number (DIN). At least one director must obtain a Digital Signature Certificate (DSC) from the certifying authority for electronic filings.

Depending upon the nature of the business activities and the business sector, companies need to register with relevant sector regulators:

- Financing and investing operations, etc., must register with the RBI as a non-banking finance company;
- Asset reconstruction companies must register with the RBI;
- Insurance services (life and non-life) and insurance broking companies, etc., must register with the Insurance Regulatory Development Authority;
- Stock brokers, sub-brokers, merchant bankers, underwriters, custodians, portfolio managers, credit rating agencies, mutual funds, venture capital, asset management companies, share transfer agents, etc., must register with SEBI; and
- Pension funds must register with the Pension Fund Regulatory and Development Authority.

Forms of entity

Companies are broadly classified as private limited companies and public limited companies. Companies may have limited or unlimited liability. A limited liability company can be limited by shares (liability of a member is limited up to the amount unpaid on shares held) or by guarantee (liability of a member is limited up to the amount for which a guarantee is given). Companies limited by shares are a common form of business entity. Public limited companies can be closely held, and unlisted or listed on a stock exchange.

A private company is one that, by virtue of its articles of association, prohibits any invitation to the public to subscribe for any of its shares or debentures; prohibits any invitation or acceptance of deposits from persons other than members, directors or their relatives; restricts the number of members to 50 (excluding employees and former employees); and restricts the right to transfer its shares.

A public company is a company that is not a private company. A public company may offer its shares to the general public and no limit is placed on the number of members. A private company that is a subsidiary of a company that is not a private company is also a public company. However, the status of a private subsidiary with more than one shareholder, where one is a foreign corporate body (holding company) and the other shareholder is not, depends on the status of its holding company.

A "section 25" company is a company formed for the purpose of promoting commerce, art, science, religion, charity or other useful objective and intends to apply its profits, if any, or other income in promoting its objects. A section 25 company is not permitted to pay dividends to its members. It must



be licensed by the government (powers delegated to Registrar of Companies) and can be a private or public company whether limited by shares or guarantee.

Requirements for public and private company

Capital. A public limited company must have a minimum paid-up capital of INR 500,000; a private limited company must have INR 100,000.

Types of share capital: There are two types of shares under the Company Law: preference shares and equity shares. Preference shares carry preferential rights in respect of dividends at a fixed amount or at a fixed rate before holders of the equity shares can be paid, and carry preferential rights with respect to the repayment of capital on winding up or otherwise. In other words, preference share capital has priority both in repayment of dividends and capital. The tenure of preference shares is a maximum of 20 years.

Equity shares are shares that are not preference shares. Equity shares can be shares with voting rights or shares with differential rights as to dividends, voting, etc. A public company may issue equity shares with differential rights for up to 25% of the total share capital issued if it has distributable profits in the preceding three years and has complied with other requirements. Listed public companies cannot issue shares in any manner that may confer on any person superior rights as to voting or dividends vis-à-vis the rights on equity shares that are already listed. A private company may freely issue shares with different rights as to dividends, voting, etc., subject to the provisions of its articles of association.

Securities can be held in electronic (dematerialized) form through the depository mode. In the case of a public/rights issue of securities of listed companies, the company must give investors an option to receive the securities in physical or electronic form. For shares held in dematerialized form, no stamp duty is payable on a transfer of the shares. Shares of unlisted public company or private company also may be held in dematerialized form.

Members, shareholders. An individual or legal entity, whether Indian or foreign, may be a shareholder of a company. A public company should have at least seven members; the minimum number of members in a private company is two and the maximum is 50 (excluding employees and former employees).

Management. Public companies with paid-up capital of INR 50 million or more must appoint a managing director or a full-time director or manager. The maximum term of a managing director/manager is five years, which may be renewed. Managing directors may hold that position in no more than two public companies. A public company with paid-up capital of INR 50 million or more also must set up an audit committee. Private companies are not required to appoint a managing director or a full-time director or manager.

Board of directors. Only individuals may be appointed as directors. A public limited company must have at least three directors and a maximum of 12 (any increase requires the approval of the Ministry of Corporate Affairs). A private company must have at least two directors. Central government approval is required where a nonresident is appointed to any managerial position (i.e. managing director, full-time director, manager) in a public company. Directors are elected by a simple majority or by methods provided in the articles of association. Remuneration of the directors of a listed company is subject to ceilings and requires approval of the central government if the company has insufficient profits or losses. Board meetings, which may be held anywhere, must be held once per quarter. Barring certain exceptions, the board has full powers and may delegate its powers to a committee of the board.

General meeting:

An Annual General Meeting (AGM) of shareholders must be held at least once in a calendar year and the time between two AGMs should not exceed 15 months (extendable up to three months with approval, except for first AGM). A company may hold its first AGM within 18 months from the date of incorporation and, in such a case, it will not be necessary to hold an AGM in the year of incorporation or the following year. Among the business to be addressed at an AGM is approval by the shareholders

of the audited financial statements for the financial year, declaration of dividends, and appointment of auditor and directors. The financial statements to be approved by the AGM cannot be older than six months from the date of the AGM (nine months in the case of the first AGM). The financial year of a company may be less or more than a calendar year, but it cannot exceed 15 months (extendable by three months by the ROC). An extraordinary general meeting can be called by the board of directors at the request of holders of 10% of the paid-up share capital.

A quorum is established when five members in a public company (two in the case of a private company), or more, according to a company's articles, are present at a meeting. If a quorum is not present, then subject to the provisions of the articles of association, the meeting is adjourned until the following week, at which time all members present, regardless of number, constitute a quorum.

There are two kinds of resolutions: ordinary and special. An ordinary resolution may be passed by a simple majority of members present in person or represented by proxy. Special resolutions require at least a 75% vote and include proposals for liquidation, transfer of the company's offices from one state to another, buyback of securities, amendment of the articles of association, increases in inter-corporate investment/loans, etc.

Unless a poll is demanded by the chairman of the general meeting or by the specified number of shareholders or by the shareholders holding specified shares, the voting at a general meeting is done through a show of hands. Each shareholder has one vote. In the case of a poll, voting rights of a member are in proportion to his share of the paid-up equity capital. Preference shareholders have the right to vote only on matters that directly affect the rights attached to preference shares. Preference shareholders have the same rights to voting as equity shareholders if the dividend has remained unpaid for a specified period.

Dividends:

Dividends must be paid in cash. Once declared, the dividend must be paid within the stipulated time. Dividends for a financial year can be paid out of (a) profits of that year after providing for depreciation; (b) out of profits of any previous financial year(s) arrived at after accounting for depreciation and remaining undistributed profits; or (c) from both. Losses or depreciation of earlier years (whichever is lower) must be adjusted from the profits before payment of dividends. Before declaring dividends from the current year's profit, the company must transfer between 2.5% and 10% of its current profits to reserves, depending on the amount of dividends declared. The accumulated profits in the reserve may be utilized for payment of dividends, subject to conditions.

Sole selling agencies:

A company may appoint a sole selling agent for a maximum period of five years. If a company has paid-up capital of more than INR 5 million, central government approval is required for the appointment. The central government prohibits the appointment of a sole selling agent in certain industries in which demand substantially exceeds supply.

Branch of a foreign corporation

In addition to establishing a wholly owned subsidiary (or setting up a joint venture in India), a foreign company may establish its presence in India by setting up a liaison office, representative office, project or site office or branch. However, a branch of a foreign company attracts a higher rate of tax than a subsidiary or joint venture company.

A liaison office (also known as representative office) acts as a communication channel between the head office abroad and parties in India. It cannot carry on commercial activities in India and cannot earn income in India. The expenses of a liaison office must be met out of inward remittances from the head office. A liaison office may be permitted to promote export from or import to India, facilitate technical and financial collaboration between a parent/group company and companies in India, represent the parent/group company in India, etc.



Foreign companies engaged in manufacturing and trading may establish a branch in India for the following activities:

- Export/import of goods (retail trading activity of any kind is strictly prohibited);
- Rendering of professional or consulting services;
- Conduct research for the head office;
- Promoting technical or financial collaboration between Indian companies and the head office or an overseas group company;
- Representing the head office in India and acting as a buying/selling agent in India;
- Rendering services in information technology and development of software in India;
- Rendering technical support for products supplied by the head office/group companies; and
- Foreign airline/shipping business.

Eligibility criteria for setting up a branch or liaison office center on the track record and net worth of the foreign head office. For a branch, the head office must have a profit-making track record in its home country during the immediately preceding five financial years (three years for a liaison office). The net worth of the foreign head office cannot be less than USD 100,000 or its equivalent to establish a branch (USD 50,000 or its equivalent to establish a liaison office). Net worth for these purposes is the paid-up share capital (+) free reserves (-) intangible assets (computed as per the latest audited balance sheet or account statement certified by a certified public accountant or registered accounts practitioner).

RBI approval, followed by registration with the RBI is required to set up a branch of a foreign company, a representative office or a liaison office. Financial statements, annual activity certificates, etc. must be submitted annually to the ROC/RBI.

Foreign companies planning to carry out specific projects in India may establish temporary project/site offices for the purpose of carrying out activities relating to the project. The RBI has granted general permission to foreign companies to establish project offices in India provided they have secured a contract from an Indian company to execute the project, and other requirements are met. If the foreign company cannot meet the requirements, it must seek approval from the RBI before setting up. Project offices may not undertake or carry on any activities other than those relating and incidental to execution of the project. Once the project is completed and tax liabilities are met, the project office may remit any project surplus outside India.

Joint ventures

Joint venture companies are commonly used for investment in India.

(ii) Regulation of business

Mergers and acquisitions

Mergers and acquisitions are generally governed by the Companies Act, 1956 and sector-specific law, such as insurance, pension, banking law, etc. The provisions of SEBI (Issue of Capital and Disclosure Requirements) Regulations, 2009, Listing Agreements with the stock exchange, SEBI (Substantial Acquisition of Shares and Takeovers) Regulations, 2011, SEBI (Prohibition of Insider Trading Regulations) 1992 must be complied with in the case of listed companies. If a merger has cross-border aspects/nonresident shareholder/investor, the parties must comply with the foreign direct investment policy of the government and Foreign Exchange Management Act, 1999. Indian companies are permitted to acquire businesses/companies abroad if certain conditions are satisfied.

In the case of a public company, broadly, the transfer of business/assets requires the approval of the shareholders. This can be done with the additional procedure of court approval or can be a simple shareholders' approval without court approval, depending on the manner of the transfer.

A reorganization involving the amalgamation of companies or a tax neutral demerger would require approval of High Court, as well as shareholders and creditors, regional director and official liquidators (for the transferor company in the case of an amalgamation). If the transferor or transferee company or both are listed on a recognized stock exchange, the draft reorganization proposal requires prior approval of the stock exchange before application is made to the High Court.

Where an acquisition exceeds the specified threshold or there is a change in control of a listed company, the acquirer must provide an exit opportunity to the shareholders through a timely public offer with appropriate disclosures. In certain acquisitions, such as an *inter se* transfer of shares between the promoter, Indian promoter and foreign collaborator, pursuant to a scheme of arrangement/ amalgamation, no open offer is required, subject to disclosures being made.

The government can order the amalgamation of two or more companies if this is in the public interest. The Board for Industrial and Financial Reconstruction can issue an order under the Sick Industrial Companies (Special Provisions) Act, 1985 for the amalgamation of an ailing industrial company with another company.

Monopolies and restraint of trade

India's markets are monopolized in only a few areas reserved for the public sector, such as postal services, defense, atomic energy and railways. The government is considering gradual private participation in areas reserved for exclusive state ownership. Monopolies are rare in activities open to the private sector.

The Competition Act, 2002 prohibits anti-competitive agreements, including the formation of cartels and the sharing of territories, restrictions of production and supply, collusive bidding and bid rigging and predatory pricing. The following practices are considered objectionable if they lead to a restriction of competition: tie-in arrangements that require the purchase of some goods as a condition of another purchase; exclusive supply or distribution agreements; refusal to deal with certain persons or classes of persons; and resale price maintenance.

The Act prohibits the abuse of a dominant position (i.e. a position of strength enjoyed by an enterprise in the relevant market in India) that enables it to operate independently of competitive forces prevailing in the relevant market, affect its competitors or consumers or the relevant market in its favor.

The acquisition of control/shares/voting rights/assets of an enterprise, a merger or an amalgamation, etc., that exceed a specified threshold of assets/turnover (in and outside India) must be approved by the Competition Commission unless an exemption applies. The Commission functions as the market regulator to prevent and regulate anti-competitive practices.

(iii) Accounting, filing and auditing requirements

Accounting standards

Accounting Standards issued by the Institute of Chartered Accountants of India, which are largely based on IAS, apply. Financial statements must be prepared annually.

Filing requirements

Companies are required to prepare their financial statements each year as per the provisions of the Companies Act and have them audited by a practicing Chartered Accountant or a firm of Chartered Accountants registered with the Institute of Chartered Accountants of India. The Companies Act permits companies to choose their financial year end. The audited financial statements must be approved by the shareholders in an annual meeting of the shareholders, which should be convened by the company normally within six months from the end of the financial year. All companies are required to file their audited financial statements with the Registrar of Companies (ROC) after they have been approved by the shareholders. With effect from fiscal years ending on or after 31 March 2011, the filing of the financial statements with the ROC must be in the extensible Business Reporting Language (XBRL) mode for certain categories of companies.



The financial statements of companies should be prepared in accordance with the accounting standards prescribed under the Companies Act. There are differences between these accounting standards and IFRS. India has proposed convergence of its accounting standards with IFRS and issued the converged standards in February 2011. The effective date of applicability of the converged standards has not yet been notified. Upon notification, these converged standards will be applicable in a phased manner to specified categories of companies. The existing standards will continue to be applicable to the category of companies that will not be required to adopt the converged standards.

The fiscal year end for purposes of filing income tax returns is March 31 for all persons including companies. In case a company has a year-end other than March 31 under the Companies Act, such company will be required to prepare a set of financial statements for the year ending March 31 and have them audited for purposes of filing its income tax return. In addition to the audited financial statements, certain other particulars that are considered in the preparation of the income tax return are also required to be audited as per the provisions of the Income Tax Act.

8.8.6 Business Taxation

(i) Overview

Taxes are levied in India at the national and state levels. The principal national taxes on companies are the corporate income tax, minimum alternate tax, capital gains tax, dividend distribution tax (DDT), wealth tax, and indirect taxes, such as value added tax (VAT), central sales tax (CST), securities transaction tax (STT), customs duty, excise duties and service tax. Transaction taxes are set to witness a major change as India works towards implementing a goods and services tax (GST) across the country. State taxes include sales tax, profession tax and real estate taxes.

Tax incentives focus mainly on establishing new industries, encouraging investments in undeveloped areas, infrastructure and promoting exports. Export and other foreign exchange earnings were previously favored with income tax incentives, but these generally have been phased out except for predominantly export-oriented units set up in SEZs. The Special Economic Zones Act (2005) grants fiscal concessions for both SEZ developers and units in the SEZs and provides for a legislative framework in establishing offshore banking units and international financial service centers.

Separate divisions of the Ministry of Finance administer various national taxes. The Central Board of Direct Taxes administers direct taxes.

A new Direct Taxes Code Bill, 2010 (DTC) that will bring about significant structural changes to direct taxation in India was unveiled on 12 August 2009 to replace the Income Tax Act that dates from 1961 and is expected to become effective on 1 April 2012. Once enacted, the DTC will consolidate and amend the law relating to income tax, DDT, capital gains tax and wealth tax, and will create a system that facilitates voluntary compliance. The chart below summarizes the corporate tax changes in the DTC:

Direct Taxes Code	
Corporate tax	The corporate income tax rate for all the companies (domestic and foreign) will be set at 30% with no surcharge or cess.
Branch profit tax	In addition to the 30% corporate income tax rate, foreign companies will be liable to a 15% branch profits tax (on total income from the permanent establishment or an immovable property situated in India as reduced by the corporate tax), regardless of whether the income is repatriated.
Minimum alternate tax	Companies will pay MAT at a rate of 20% of <i>adjusted book profits</i> of corporations whose tax liability is less than 20% of their book profits, with a credit available for MAT paid against tax payable on normal income, which may be carried forward for 15 years. MAT will continue to apply to both domestic and foreign companies.

Dividend distribution tax	Resident companies will be subject to DDT at a rate of 15% of dividends declared and dividends that have been subject to DDT will be exempt from tax in the hands of the recipient.
Securities transaction tax	The STT will be abolished.
Wealth tax	Wealth tax is to be paid by every person other than a non-profit organization and the threshold limit of the net wealth will be increased to INR 10 million (currently INR 3 million).
Withholding tax	<i>Dividends</i> - If dividends paid by a resident company are not subject to DDT, the payer will be required to withhold tax at a rate of 10% (20% for nonresident recipients unless reduced by a tax treaty). No surcharge or cess will apply. <i>Interest, royalties and fees for technical services</i> - The withholding tax rate will be 10% (20% for nonresidents unless reduced by a tax treaty) and no surcharge or cess will apply. <i>“Other payments”</i> - A 30% withholding tax rate will apply for nonresidents (unless reduced by a tax treaty) on any other payments not specifically mentioned in the DTC. No surcharge or cess will apply.
Treaty override	The provisions of a tax treaty will override domestic law except where the General Anti Avoidance Rule (GAAR), controlled foreign company (CFC) and branch profits tax rules apply.
Domestic company	A “domestic company” will be defined as a company that is resident in India, i.e. if it is an Indian company (incorporated in India) or its place of effective management is in India at any time in the financial year.
Losses	Losses would be able to be carried forward indefinitely.
Depreciation	The scope of intangible assets will be expanded to include expenditure on any asset or project constructed or otherwise set up by the assessee where the benefit or advantage arises to the assessee but the asset is not owned by the assessee (at a rate of 20% if the benefit period does not exceed 10 years, 15% if it does).
Capital gains	Income from the transfer of an investment asset (except for personal effects and agricultural land) will be subject to tax as capital gains. The distinction between a short and long-term investment asset will be eliminated. The base date for determining the acquisition cost for computing capital gains will shift from 1 April 1981 to 1 April 2000. Further, any gain (long-term or short-term) arising on the transfer of an investment asset will be included in the taxpayer’s total income, chargeable to tax at the applicable slab rate. Gains from the transfer of shares of a nonresident company by one nonresident company to another if the nonresident company having its shares transferred indirectly holds a “controlling interest” in an Indian company will be taxable, subject to conditions.
Incentives	All but a few of the tax exemptions will be abolished and replaced with investment-linked incentives.
Related party transactions	The threshold limits for two enterprises to be classified as associated enterprises will be reduced. Advance pricing agreements and safe harbor rules will be introduced.



Returns	The tax return filing date will be 30 June following the financial year for taxpayers that are not companies and having any income from business, and 31 August following the financial year for all other taxpayers.
Penalties	The amount of a penalty will be 100%-200% of the amount of tax payable in respect of the amount by which the tax base is underreported.
GAAR	A new GAAR will empower the tax authorities to declare an arrangement as impermissible avoidance arrangement if it was entered into with the objective of obtaining a tax benefit, and (a) it creates rights or obligations that normally would not be created between persons dealing at arm's length; (b) it results, directly or indirectly, in the misuse or abuse of the DTC; (c) it lacks commercial substance in whole or in part; and (d) it is carried out in a manner that would not be used for bona fide purposes.

(ii) Residence

A company is considered resident in India if it is incorporated in India or if control and management of its affairs take place wholly in India.

(iii) Taxable income and rates

Corporate entities liable for income tax include Indian companies and corporate entities incorporated abroad. A resident company is liable for income tax on its worldwide income, including capital gains, less allowable deductions (essentially, outlays incurred exclusively for business purposes). A nonresident company is liable for income tax on income arising in or received in India or deemed to arise or accrue in India. Income that is deemed to accrue or arise in India includes:

- Income arising from a "business connection," property, asset or source of income in India;
- Capital gains from the transfer of capital assets situated in India; and
- Interest, royalties and technical service fees paid by an Indian resident, nonresident or the Indian government. Payments made to a nonresident for the provision of services are taxable in India even if the services are rendered outside the country. Where the fees are payable in respect of services used in a business or profession carried on by such person outside India or for the purpose of making or earning income from a source outside India, they are not taxable in India.

Different rates apply to resident and nonresident companies

The corporate tax rate for domestic companies is 30%, in addition to a surcharge of 5% where the total income exceeds INR 10 million. A 2% education cess and 1% secondary and higher education cess (collectively referred to as "cess") also are levied on the amount of income tax including the surcharge. The effective tax rate for domestic companies is, therefore, 30.9% (where income is less than or equal to INR 10 million) and 32.445% (where income exceeds INR 10 million).

Nonresident companies and branches of foreign companies are taxed at a rate of 40%, plus a surcharge of 2%, where total income exceeds INR 10 million. The amount of tax is further increased by a 3% cess, bringing the effective tax rate to 42.024%, where income exceeds INR 10 million and 41.2%, where income is less than or equal to INR 10 million.

The taxable income of nonresident companies engaged in certain businesses (i.e. prospecting for, extraction or production of mineral oils, civil construction, testing and commissioning of plant and machinery in connection with turnkey power projects) is deemed to be 10% of the specified amounts. Similarly, for nonresidents in the business of operating ships and aircraft, profits and gains from the operations are deemed to be 7.5% and 5%, respectively, of the specified amounts.

A minimum alternate tax (MAT) is imposed on resident and non-resident corporations. As from 1 April 2011, where the income tax payable on the total income by a company is less than 18.5% of its book profits, the book profits are deemed to be the total income of the company on which tax is payable at a rate of 18.5%.

further increased by the applicable surcharge and cess for both domestic and foreign companies. Thus, the effective MAT rate for a domestic company is 19.06% where the total income is less than or equal to INR 10 million, and 20.01% where the total income exceeds INR 10 million (rates comprise the base rate of 18.5%, plus the applicable surcharge of 5% and cess of 3%). For nonresident companies, the effective MAT rate is 19.06% where the total income is less than or equal to INR 10 million, and 19.44% where the total income exceeds INR 10 million (rates comprise the base rate of 18.5%, plus the applicable surcharge of 2% and the 3% cess). Tax paid under the MAT provisions may be carried forward to be set off against income tax payable in the next 10 years, subject to certain conditions. The scope of MAT has been broadened by making developers of SEZs and units in SEZs liable to pay MAT. MAT also applies at a rate of 18.5% on limited liability partnerships.

A domestic company is required to pay DDT of 15% (plus a surcharge of 5% and 3% cess) on any amounts declared, distributed or paid as dividends. After adding the cess, the effective DDT rate is 16.2225%. However, the ultimate Indian holding company is allowed to set off the dividends received from its Indian subsidiary against dividends distributed in computing the DDT tax provided certain conditions are satisfied. Dividends paid to the New Pension Scheme Trust are exempt from DDT.

Taxable income defined

The law divides taxable income into various categories or "heads." The heads of income relevant to companies are:

- Business or professional income;
- Capital gains;
- Income from real estate; and
- Other income.

In general, a company's taxable income is determined by aggregating the income from all of the heads. The computation of business income is normally based on the profits shown in the financial statements, after adjusting for exempt income, nondeductible expenditure, special deductions and unabsorbed losses and depreciation.

Dividends paid by a domestic company are exempt from tax in the hands of the recipient provided DDT has been paid by the distributing company, but dividends on which DDT has not been paid are taxed as income in the hands of the recipient at the normal rates subject to treaty rates.

Deductions

Various deductions are taken into account in computing taxable income and each head of income has its own special rules. Allowable deductions include wages, salaries, reasonable bonuses and commissions, rent, repairs, insurance, royalty payments, interest, lease payments, certain taxes (sales, municipal, road, property and expenditure taxes and customs duties), depreciation, expenditure for materials, expenditure for scientific research and contributions to scientific research associations and professional fees for tax services.

Specific deductions are allowed as follows:

- A 100% deduction for interest payments on capital borrowed for business purposes. However, if the capital is borrowed for the acquisition of an asset for the expansion of an existing business or profession, interest paid for any period beginning from the date on which the capital was borrowed for the acquisition of the asset up to the date the asset was first put into use is not allowable as a deduction; instead, it may be capitalized with the cost of the asset and eligible for depreciation.
- Capital expenditure on research conducted in-house (this can rise to 200%) and for payments made for scientific research to specified companies or specified organizations (200%) for payments to a national government laboratory, certain educational institutions and certain approved research programs).



- Investment-linked incentives (a 100% deduction for capital expenditure other than expenditure incurred on the acquisition of land, goodwill or financial instruments) for setting up and operating cold chain facilities, warehousing and laying and operating cross country natural gas or crude or petroleum oil pipeline networks for distribution, including storage facilities that are an integral part of such networks. This incentive is also available on investment made in housing projects under a scheme for affordable housing, building and operating two-star hotel, building and operating a hospital with 100 beds and for the production of fertilizer in India.
- Interest, royalties and fees for technical services paid outside India to overseas affiliates or in India to a nonresident provided tax is withheld.
- Payments to employees under voluntary retirement schemes may be deducted over five years. To encourage companies to employ additional workers, an amount equal to 30% of additional wages paid to new workmen is allowed as a deduction for three years subject to certain conditions.
- Securities transaction tax paid.
- Business losses (see below).

Indian tax law does not permit companies to take a deduction for a general bad debt reserve, although specific bad debts may be deducted when written off. Expenses incurred for raising share capital are not deductible, as the expenditure is considered capital in nature. No deduction is allowed for expenditure incurred on income that is not taxable or for payments incurred for purposes that are an offense or prohibited by law or that were subject to withholding tax by the payer and the withholding obligation was not correctly administered.

Indian branches of foreign corporations may only claim limited tax deductions for general administrative expenses incurred by the foreign head office. These may not exceed 5% of annual income or the actual payment of head office expenditure attributable to the Indian business during the year (unless otherwise provided for in an applicable tax treaty), whichever is lower.

Depreciation

Asset depreciation is usually calculated according to the declining-balance method (except for assets of an undertaking engaged in the generation or generation and distribution of power for which the straight-line method is optional). Depreciation is based on actual cost, i.e. the purchase price plus capital additions, including certain installation expenses.

The depreciation rate on general plant and machinery is 15%. Subject to certain conditions, additional depreciation on new plant and machinery acquired on or after 1 April 2005 may be available at 20% of actual cost. Factory buildings may be depreciated at 10%; furniture and fittings at 10%; computers and software at 60%; specified energy-saving devices at 80%; and specified environmental protection equipment at 100%. Depreciation is allowed at 100% for buildings acquired after 1 September 2002 for the installation of plant or machinery, but only for water supply projects or water treatment systems put to use as infrastructure facilities.

Depreciation is 50% of normal rates if an asset is used for less than 180 days in the first year. Depreciation allowances on buildings, machinery, factories and factory equipment or furniture, are available on assets partly owned by a taxpayer. Unabsorbed depreciation may be carried forward indefinitely.

Capital assets purchased for scientific research may be written off in the year the expenditure is incurred. Preliminary outlays for project or feasibility reports (limited to 5% of the cost of the project or capital employed) may be amortized over five years from the commencement of business incurred after 31 March 1998 (2.5% over 10 years for expenses before that date).

For succession in businesses and amalgamation of companies, depreciation is allowed to the predecessor and the successor, or the amalgamating and amalgamated company, according to the number of days they used the assets.

If an asset has been sold and leased back, the actual cost for computing the depreciation allowance is

the written-down value to the seller at the time of transfer. Certain types of intangible assets that have been acquired may be amortized at a rate of 25%.

Losses

Losses arising from business operations in an assessment year may be set off against income from any source in that year. A business loss may be carried forward and set off against future business profits in the next eight assessment years. Closely held companies must satisfy a 51% continuity of ownership test to qualify for business loss carry forward.

Losses arising from the transfer of short-term capital assets during an assessment year may be set off against capital gains (whether long-term or short-term) arising during the assessment year. The balance of losses, if any, may be carried forward to offset capital gains in the subsequent eight years. Long-term capital losses may be set off only against long-term capital gains during the year. The balance of losses, if any, may be carried forward for the subsequent eight assessment years to offset against long-term capital gains. Losses may be carried forward only if the tax return is filed by the due date. However, unabsorbed depreciation can be carried forward indefinitely, even if the tax return is not filed by the due date.

8.8.7 Capital Gains Taxation

Gains derived from the disposition of capital assets are subject to capital gains tax, the tax treatment of which depends on whether the gains are long-term or short-term. The minimum holding period for long-term capital gains is three years, although this period is reduced to one year in the case of shares and specified securities/bonds and units of mutual funds.

Short-term capital gains on listed shares and units of an equity-oriented mutual fund where STT is paid are taxed at a rate of 15% (plus the applicable surcharge and cess). Long-term capital gains (on listed shares and units of equity-oriented mutual funds held for at least one year) where STT is paid are exempt.

Nonresidents pay capital gains tax on the sale of securities in an Indian company, based on the value of the securities in the foreign currency in which they were purchased. The capital gains are reconverted into rupees and taxed; no cost inflation index is applied.

Long-term capital gains of FIIs on listed shares and units of equity-oriented mutual funds where STT is paid are exempt, and short-term capital gains on such assets where STT is paid are taxed at 15% (plus the applicable surcharge and cess). Other long-term capital gains derived by FIIs (i.e. gains not arising from listed securities that are exempt as discussed above) are taxed at 10% (plus the applicable surcharge and cess). Other short-term capital gains derived by FIIs (i.e. gains not arising from listed securities referred to above) are taxed at 30%, plus the applicable surcharge and cess.

Other long-term capital gains derived by residents and nonresidents (i.e. gains not arising from listed securities that are exempt as discussed above) are taxed at 20% (plus the applicable surcharge and cess). In calculating long-term gains, the costs of acquiring and improving the capital asset are linked to a cost inflation index published by the government. The holder of an asset purchased before 1 April 1981 may use the fair market value of the asset on that date as the cost basis for computing the capital gain. This generally reduces tax liability.

Other short-term capital gains derived by residents and nonresidents (i.e. gains not arising from listed securities referred to above) are taxed at normal rates (plus the applicable surcharge and cess).

Gains from the sale of long-term capital assets are exempt from capital gains tax if they are reinvested in certain securities (subject to an annual investment cap of INR 5 million) within six months and locked in for three years.

Double taxation relief

Unilateral relief

A resident of India that derives income from a non-tax treaty country is eligible for a credit for the



foreign income taxes paid. The credit is granted on a country-by-country basis and is limited to the lesser of the tax on income from the foreign country concerned or the foreign income tax paid on the income. Most of India's treaties grant relief from double taxation by the credit method or by a combination of the credit and exemption methods.

Tax treaties

India has a comprehensive tax treaty network in force with many countries. There are also agreements limited to aircraft profits and shipping profits. India's treaties also generally contain OECD-compliant exchange of information provisions.

The Indian government issued a "notification" on 17 September 2012 that specifies the procedure for taxpayers to obtain benefits under India's tax treaties. A measure in the Finance Act 2012 makes it mandatory for a nonresident to obtain a tax residence certificate from the authorities in its country of residence. The tax residence certificate must contain the following information:

- Name of the taxpayer;
- Status (individual, company, firm, etc.);
- Nationality;
- Tax identification number in the country of residence;
- Residence status for tax purposes;
- Period for which the certificate is applicable; and
- Address of the taxpayer for the period in which the certificate is applicable.

INDIA TAX TREATY NETWORK			
Armenia	Hungary	Mozambique	Sudan
Australia	Iceland	Myanmar	Sweden
Austria	Indonesia	Namibia	Switzerland
Azerbaijan	Israel	Nepal	Syria
Bangladesh	Italy	Netherlands	Taiwan
Belarus	Japan	New Zealand	Tajikistan
Belgium	Jordan	Norway	Tanzania
Botswana	Kazakhstan	Oman	Thailand
Brazil	Kenya	Philippines	Trinidad & Tobago
Bulgaria	Korea (R.O.K.)	Poland	Turkey
Canada	Kuwait	Portugal	Turkmenistan
China	Kyrgyzstan	Qatar	Uganda
Cyprus	Libya	Romania	Ukraine
Czech Republic	Luxembourg	Russia	United Arab Emirates
Denmark	Malaysia	Saudi Arabia	United Kingdom
Egypt	Malta	Serbia	United States
Faroe Islands	Mauritius	Singapore	Uzbekistan
Finland	Mexico	Slovakia	Vietnam

France	Moldova	Slovenia	Zambia
Georgia	Mongolia	South Africa	
Germany	Montenegro	Spain	
Greece	Morocco	Sri Lanka	

8.8.8 Anti-Avoidance Rules

Transfer pricing

The transfer pricing regulations are broadly based on the OECD guidelines, with some differences (and more stringent penalties). Definitions are provided for "international transaction," "associated enterprise" and "arm's length price." The definition of associated enterprise extends beyond shareholding or management relationships, as it includes some deeming clauses. The arm's length principle is enforced by determining an arm's length price for an international transaction, and allowing a deviation from that to be within 5% of the price of the international transaction. Taxpayers must maintain documentation and obtain a certificate (in a prescribed format) from a chartered accountant furnishing the details of international transactions with associated enterprises, along with the methods used for benchmarking. Where the application of the arm's length price would reduce the income chargeable to tax in India or increase the loss, no adjustment is made to the income or loss. If an adjustment is made to a company enjoying a tax holiday, the benefit of the holiday will be denied in relation to the adjustment made.

Transfer pricing audits have been aggressive and the topic of substantial controversy and litigation in recent years. Several measures, such as the introduction of a Dispute Resolution Panel, additional resources to handle transfer pricing audits and an extension of the time to complete the audit have been introduced to reduce the burden of the audit on the tax officers and make the audit process more "reasonable" so that the results are evaluated according to the facts and circumstances of each taxpayer.

Thin capitalization

India does not have thin capitalization rules.

Controlled foreign companies

India does not have CFC rules, but these are proposed under the DTC.

General anti-avoidance rule

India currently does not have a GAAR, but one is included in the DTC.

8.8.9 Administration

Tax year

The tax year in India, known as the "previous year" (fiscal year), is the year beginning 1 April and ending 31 March. Income tax is levied for a previous year at the rates prescribed for that year. Income of a fiscal year is assessed to tax in the next fiscal year (i.e. assessment year).

Filing and payment

Taxes on income of an assessment year are usually paid in installments by way of advance tax. A company must make a prepayment of its income tax liabilities by 15 June (15% of the total tax payable), 15 September (45%), 15 December (75%) and 15 March (100%). Any overpaid amount is refunded after submission of the final tax return.

A company must file a final tax return, reporting income of the previous year, by 30 September immediately following the end of the fiscal year, stating income, expenses, taxes paid and taxes due for the preceding tax year. A non-corporate taxpayer that is required to have its accounts audited also



must file a return by 30 September. The due date for filing returns and transfer pricing accountants report is extended to 30 November for taxpayers with international transactions during the year. All other taxpayers must submit a return by 31 July. Guidance is issued annually for the selection of tax returns for scrutiny by the tax authorities. If the tax authorities can prove concealment of income, a 100%-300% penalty may be levied on the tax evaded.

All taxpayers are required to apply for a permanent account number (PAN) for purposes of identification. The PAN must be quoted on all tax returns and correspondence with the tax authorities and on all documents relating to certain transactions. As from 1 April 2010, every recipient (whether resident or nonresident) of India-source income subject to withholding tax must furnish a PAN to the Indian payer before payment is made. Otherwise, tax will have to be withheld at the higher rate as prescribed.

Consolidated returns

No provision is made for group taxation or group treatment; all entities are taxed separately.

Statute of limitations

If a tax officer believes that income has escaped assessment, proceedings can be reopened within seven years from the end of the financial year in which the income escaping audit exceeds INR 1 million. However, the proceedings can be reopened only within five years if the tax officer has conducted an audit and assessed income, and the taxpayer has submitted a return and fully disclosed all material facts necessary for assessment. There is no limitations period for the authorities to collect tax once an audit is completed and a demand for tax is made.

Tax authorities

The Central Board of Direct Taxes (CBDT) is the apex body which is responsible for providing essential inputs for policy and planning of direct taxes in India and for administration of direct tax laws through the following subordinate income tax authorities:

- Director-General of Income-tax or Chief Commissioners of Income-tax;
- Director of Income-tax or Commissioner of Income-tax or Commissioner of Income-tax (Appeals);
- Additional Director of Income-tax or Additional Commissioner of Income-tax or Additional Commissioner of Income-tax (Appeals);
- Joint Director of Income-tax or Joint Commissioner of Income-tax;
- Deputy Director of Income-tax or Deputy Commissioner of Income-tax or Deputy Commissioner of Income-tax (Appeals);
- Assistant Director of Income-tax or Assistant Commissioner of Income-tax;
- Income-tax Officer;
- Tax Recovery Officer; and
- Inspector of Income-tax.

Rulings

The Authority for Advance Rulings issues rulings on the tax consequences of transactions or proposed transactions with nonresidents. Rulings are binding on the applicant and the tax authorities for the specific transaction(s).

8.8.10 Withholding Taxes

(i) Dividends

India does not levy withholding tax on dividends. However, the company paying the dividends is subject to DDT at a rate of 15% (plus a surcharge of 5% and a cess of 3%).

(ii) Interest

Interest paid to a nonresident is generally subject to a 20% withholding tax, plus the applicable surcharge and cess (2% surcharge if payment exceeds INR 10 million and 3% cess, for a withholding rate of 20.6% or 21.012%). The rates may be reduced under a tax treaty.

(iii) Royalties

The withholding tax on royalties and fees for technical services paid to a nonresident is 10% unless reduced by treaty. Additionally, a surcharge (2% if the payment exceeds INR 10 million) and cess (3%) are imposed, increasing the withholding tax to 10.3% or 10.506%.

(iv) Branch remittance tax

Indian branches of nonresident companies are subject to a 40% corporate income tax on Indian-source income earned by or attributed to the branch.

(v) Wage tax/social security contributions

There are no wage taxes. Both the employer and the employee are required to contribute to social security. The employee contributes 12% of his/her salary to the employee provident fund and 1.75% to the state insurance scheme.

(vi) Other

Contractor's tax

All companies must withhold tax at a rate of 40% plus a surcharge (2% if the payment exceeds INR 10 million) and cess (3%) from payments to a nonresident contractor companies and 30% plus a surcharge (2% if the payment exceeds INR 10 million) and cess (3%) in the case of individuals for carrying out any work under a contract or for supplying labor for carrying out such work, subject to satisfaction of certain conditions. An application may be submitted to the tax authorities to benefit from a lower rate or an exemption.

8.8.11 Indirect Taxes

(i) Value added tax

All Indian states, including union territories, have moved to the VAT regime – a broad-based “consumption-type destination-based VAT” driven by the invoice tax credit method that applies to almost all types of movable goods and specified intangible goods, barring a few exempted goods that vary from state to state. The tax paid on specified inputs procured within any state involved in the manufacturing of goods for sale within the state or for interstate sale and the input tax on specified goods purchased within the state by a trader (in both cases from registered dealers) are available as VAT credits, which may be adjusted against the tax on output sales within the state or the tax on interstate sale.

The standard VAT rate is 12.5%, with reduced rates of 5% and 1% in most states. The reduced rates apply to the sale of agricultural and industrial inputs, capital goods and medicines, precious metals, etc. A refund of input tax is available for exporters.

Registration is compulsory for businesses exceeding a certain annual turnover (INR 500,000 in most states), although certain state VAT laws also specify monetary limits of sales and/or purchases. VAT returns and payments are either monthly or quarterly based on the amount of the tax liability.

(ii) Capital tax

India does not levy capital duty, although a registration duty is levied.

(iii) Real estate tax

Owners of real estate are liable to various taxes imposed by the state and municipal authorities. These taxes vary from state to state.



(iv) Transfer tax

STT is levied on the purchase or sale of an equity share, derivative or unit of an equity-oriented fund entered in a recognized stock exchange in India at the following rates:

- 0.025% paid by the seller on the sale of an equity share or unit of an equity-oriented fund that is non-delivery-based;
- 0.017% paid by the seller on the sale of an option and futures in securities;
- 0.25% paid by the seller on the sale of unit of equity oriented fund to the mutual fund;
- 0.125% paid by the buyer on the sale of an option in securities, where the option is exercised; and
- 0.125% each paid by the buyer/seller on the purchase/sale of an equity share or unit of an equity-oriented fund that is delivery-based.

STT paid in respect of taxable securities transactions entered into in the course of business is allowed as a deduction if income from the transactions is included in business income.

(v) Stamp duty

Stamp duty is levied on instruments recording certain transactions, at rates depending on the nature of instrument and whether the instrument is to be stamped under the Indian Stamp Act, 1899 or under a State stamp law. Stamp duty rates for an instrument vary from state to state.

(vi) Customs duties

Customs duties are levied by the central government generally on the import of goods into India, although certain exported goods also are liable to customs duties. The basis of valuation in respect of imports and exports is the transaction value, except where the value is not available or has to be established because of the relationship between the parties.

The rate of basic customs duty is 10%. However, the aggregate customs duty, including additional duties and the education cess, is 26.85%. Several products attract the basic customs duty of 7.5%, which works out to an effective duty of 23.89%. The rates vary depending on the classification of the goods under the Customs Tariff Act, 1975. Safeguard and anti-dumping duties also are levied on specified goods. The clearance of goods from Customs is based on self-assessment of bills of entries for imports.

(vii) Other taxes

Central sales tax

The central government levies a central sales tax (CST) on the interstate movement of goods, but the tax is collected and retained by the origin state. CST is levied at a rate of 2% on the movement of such goods from one state to another provided specified forms are submitted. Failure to submit the specified forms results in CST being charged at the applicable local rate of the state. Registration is compulsory for all dealers engaging in interstate sales or purchase transactions liable to CST. CST returns and payments are monthly or quarterly based on the period applicable for filing the return/payment of tax in the state in which CST is required to be paid.

CST paid on interstate purchases is not allowed as a set off or as a credit against VAT/CST payable in any state. Stock transfers of goods between states also are subject to reversal (surrendering) of the input tax credit up to specified percentages (ranging from 2% to 4% of the purchase value of respective goods) in the state from which the goods are stock transferred.

Service tax

Service tax is levied at 10.30% of the value of taxable services (including the education cess and the secondary and higher education cess) on a broad range of services. More than 118 services are

subject to service tax, including advertising, brokering, business auxiliary, business support, information technology software, supply of tangible goods, banking and financial consulting, construction, credit rating, management consulting, financial leasing, franchise services, credit card services, merchant banking, cargo handling, cable operation, storage and warehousing, intellectual property services, air-conditioned restaurant services, short-term accommodation, renting of commercial property and works contract services. Service providers having aggregate value of taxable services up to INR 1 million are outside the scope of service tax, subject to certain conditions.

The receipt basis for determining the point of taxation was replaced as from 1 April 2011 in favor of a new rule based on an accrual system of accounting. Credit for inputs, capital goods and input services used in the provision of taxable output services is available, subject to specific conditions. Trading and partially taxed services, however, are exempted services for purposes of an input tax credit to offset output tax.

Central excise duty

A central excise duty is levied by the central government on the production or manufacture of goods in India. Liability for paying the duty is on the producer or manufacturer. Excise duty rates are based on the transaction value, except where such value is not available or has to be otherwise established. The standard excise duty rate is 10.3%, including education cess. The rates vary depending on the classification of goods under the Central Excise Tariff Act, 1985. Credit for inputs, capital goods and input services used in the production of excisable goods is available subject to specific conditions.

Wealth tax

Wealth tax is levied on specified assets and on specified categories of persons on specified assets exceeding INR 3 million. The wealth tax is 1% on the aggregate value of specified assets (net of debt secured on, or incurred in relation to, the assets).

R&D cess

The R&D Cess Act (1986) provides for a cess of 5% on payments made for the import of "technology." A credit mechanism to offset the cess may be available in certain situations upon the fulfillment of certain requirements.

Goods and services tax

India is expected to implement a goods and services tax and a bill to amend the India's constitution to facilitate introduction of the same is pending before the Parliament.

8.8.12 Taxes on Individuals

As noted above, a new DTC that will bring about significant structural changes to direct taxation in India will become effective during 2012. The following chart below summarizes the main personal tax changes in the DTC.

Direct Taxes Code	
Residence	The principles of taxation of income broadly remain intact. However, the term "resident and not ordinarily resident" will be abolished, and the exception clause for the residence test under the Income-tax Act for an Indian citizen or person of Indian origin on a visit to India will not be available.



Exemptions and deductions	The following deductions/exemptions will be available: · Investment in approved funds, such as the provident fund, superannuation fund, pension fund, gratuity fund and any other approved fund – INR 100,000 · Life/health insurance of specified persons and tuition fees (including play school or pre-school) – INR 50,000 · Interest on housing loan for self-occupied property – INR 150,000 · Medical reimbursements – INR 50,000 The following exemptions/deductions will not be available: · House rent allowance · Leave travel allowance · Leave encashment · Medical treatment for dependent siblings · Interest on loan from charitable institution	
Taxbrackets	The brackets for individual tax rates will be broadened. The basic exemption limit is kept at INR 200,000 without any gender concession. Resident senior citizens will be eligible for higher basic exemption of INR 250,000. The income slabs and rate of taxation are:	
	Slab of income (INR)	Rate of tax (%)
	Up to 200,000	Nil
	200,001 – 500,000	10
	500,001 – 1 million	20
	1,000,001 and above	30
Capital tax	Net wealth in excess of INR 10 million will be chargeable to wealth tax at a rate of 1%. Resident foreign nationals need to offer overseas wealth to taxation in India. The definition of "wealth" has been expanded to cover different categories of assets, and the value of the assets will be as per prescribed rules (except for cash).	
Treaty benefits	A person resident overseas will be required to furnish a residence certificate from his/her home country to claim a tax exemption in India under a tax treaty. The unilateral tax credit for taxes paid in countries that have not concluded a treaty with India is not addressed in the DTC.	

(i) Residence

The extent of an individual's liability for personal income tax depends on whether the individual is resident and ordinarily resident, resident but not ordinarily resident, or nonresident in India.

For tax purposes, an individual is resident in India if he/she is physically present for at least 182 days in the country in a given year, or 60 days in a given year and 365 days or more in the preceding four years. Individuals not satisfying the above condition will be nonresidents for that year. Indian citizens leaving India for employment or as members of the crew of an Indian ship and, for an Indian citizen/person of Indian origin working abroad who visits India while on vacation, the threshold is 182 days in the relevant year instead of 60 days.

A "not ordinarily resident" individual is a person who has either not been a resident in nine out of the 10 preceding years or who has been in India for 729 days or less during the preceding seven years. As a result, expatriate managers who have lived in India continuously for two years may be liable to tax on their worldwide income in the third or fourth year.

(ii) Taxable income and rates

Personal income tax is levied on only about 3.5% of India's more than one billion citizens. The states levy profession tax on salaried employees and persons carrying on profession or trade at rates that vary by state.

Taxable income

An individual's income is categorized into different heads of income:

- Employment income;
- Business or professional income;
- Income from real estate;
- Capital gains; and
- Other income.

Ordinarily residents of India are taxed on worldwide income. Persons not ordinarily resident generally do not pay tax on income earned outside India unless it is derived from a business/profession controlled in India, or the income is accrued or first received in India or is deemed to have accrued in India.

Nonresidents are liable to tax on India-source income, including: (1) interest, royalties and fees for technical services paid by an Indian resident; (2) salaries paid for services rendered in India; and (3) income that arises from a business connection or property in India. They are also liable to tax on any income first received in India.

Expatriates

Remuneration received by foreign expatriates working in India generally is assessable under the head "salaries" and is deemed to be earned in India. Income payable for a leave period that is preceded and succeeded by services rendered in India and that forms part of the service contract is also regarded as income earned in India. Thus, irrespective of the residence status of an expatriate employee, the salary paid for services rendered in India is liable to tax in India.

There are no special exemptions or deductions available to foreign nationals working in India. However, a foreign national who comes to India on short-term business visits can claim an exemption under the domestic tax law or a relevant tax treaty.

Where salary is payable in foreign currency, the salary income must be converted to Indian rupees. For this purpose, the rate of conversion to be applied is the telegraphic transfer-buying rate as adopted by the State Bank of India on the last day of the month immediately preceding the month in which the salary is due or paid. However, if tax is to be withheld on such an amount, the tax withheld is calculated after converting the salary payable into Indian currency at the rate applicable on the date tax was required to be withheld.

Value of benefits

The government has laid down valuation rules for determining the taxable value of the benefits provided to an employee:

- Rent free accommodation – Specified percentage of the employee's salary depending on the city where the accommodation is located.
- Use of movable assets of employer – 10% per annum of the actual cost of the assets or the amount of rent paid by the employer if the assets are leased (the use of computers and laptops is not treated as a perquisite).
- Interest-free/concessional loans exceeding INR 20,000 – Interest computed at the annual rate charged by the State Bank of India.



- Other benefits – The taxable perquisites value will be computed per the prescribed valuation rules.
- Approved superannuation fund – A contribution in excess of INR 100,000 is taxable.
- Medical reimbursements/health insurance premiums – Exempt up to INR 15,000 per annum.
- Voluntary retirement schemes – Exempt up to INR 500,000 on satisfaction of specified conditions.

Deductions and reliefs

Standard deductions are not allowed. Allowed deductions include contributions to life insurance; recognized provident funds; national savings certificates; the national savings scheme; subscriptions to certain mutual funds; deposits made under the Senior Citizen Savings Scheme Rules (2004); five-year time deposits under the Post Office Time Deposit Rules (1981); certain education expenses up to INR 100,000; interest on loans for higher education (self, spouse and children) without limit; mortgage interest up to INR 150,000 annually on home loans obtained on or after 1 April 1999 if the borrower resides in the home; royalties received by authors of literary, artistic and scientific books and for income from the exploitation of patents of up to INR 300,000. An additional deduction of INR 20,000 is allowed for investments in infrastructure bonds.

Rates

The personal tax rate is imposed at progressive rates of up to 30% (not including education surcharges totaling 3% that are levied on tax payable). A general exemption from tax and filing obligations applies for those with an income of less than INR 180,000 (INR 190,000 for resident female taxpayers below 60 years of age) and INR 250,000 for resident senior citizens. A new category of taxpayer called "very senior citizen" has been introduced to cover individuals who are 80 years and above. The basic exemption limit for this category is INR 500,000.

The current tax brackets are: 10% bracket (exclusive of surcharges) for income from INR 180,001 to INR 500,000; the 20% bracket from INR 500,001 to INR 800,000 and the 30% bracket (exclusive of surcharges) for amounts in excess of INR 800,000.

(iii) Inheritance and gift tax

India does not levy inheritance or gift tax.

(iv) Net wealth tax

All individuals and other specified persons must pay a 1% wealth tax on the aggregate value of net wealth exceeding INR 3 million of non-productive assets such as land; buildings not used as factories; commercial property not used for business or profession; residential accommodation for employees earning over INR 500,000 per annum; gold, silver, platinum and other precious metals, gems and ornaments; and cars, aircraft and yachts.

(v) Real property tax

Municipalities levy property taxes (based on assessed value), and states levy land-revenue taxes.

(vi) Social security contributions

Both the employer and the employee are required to contribute to social security. The employee contributes 12% of his/her salary to the employee provident fund and 1.75% to the state insurance scheme.

(vii) Compliance

All taxpayers are required to apply for a permanent account number (PAN) for purposes of identification. The PAN must be quoted on all tax returns and correspondence with the tax authorities and on all documents relating to certain transactions. As from 1 April 2010, every recipient (whether resident or nonresident) of India-source income subject to withholding tax must

furnish a PAN to the Indian payer before payment is made. Otherwise, tax will have to be withheld at the higher rate as prescribed.

Individuals must file an income tax return showing their total income in the previous year if it exceeds INR 0.5 million. The return must be filed in respect of a previous year is 31 July of the assessment year.

8.8.13 Labor Environment

1. Employee rights and remuneration

India's labor laws are complex, with more than 60 pieces of relevant legislation. Employers face particular difficulties in terminating employment and closing an industrial establishment.

Working hours

The Factories Act, 1948 requires maximum working hours of 48 hours per week. In practice, office employees normally work a five-day week of 40-45 hours. Factory workers have on average a six-day week of 48 hours. Any work beyond nine hours per day or 48 hours per week requires payment of overtime at double the normal wage.

Maternity leave of 12 weeks is provided under the Maternity Benefit Act, 1961.

The Industrial Employment (Standing Orders) Act, 1946 requires industrial establishments with 100 (number may vary by state) or more employees to establish standing orders that specify working conditions (hours, shifts, annual leave, sick pay, termination rules, etc.). These orders must meet minimum state standards and may be changed only with the consent of the workers or the trade unions and only to augment benefits.

2. Wages and benefits

Wages and fringe benefits vary considerably depending on the industry, company size and region. The floor level minimum wage is INR 115 per day and may be higher in certain industries. Wages generally have two components: the basic salary and the dearness allowance, which is linked to the cost-of-living index. The allowance, paid as part of the monthly salary, may be at a flat rate or on a scale graduated by income group. A mandatory bonus supplements wages.

Companies use both time and piece rates. The former is more common in organized factory industries, such as engineering, chemicals, cement, paper, etc. Rates may be per hour, day, week or month. Piece rates, which the government has encouraged to boost productivity, are usually paid monthly, although casual workers are paid on a daily basis. Some industries pay production premiums.

In the organized sector, wages are often set by settlements reached between trade unions and management. Statutory benefits, such as provident funds, pensions and bonuses, normally add 30%-42% to the base pay.

The Payment of Bonus Act, 1965 requires all employers covered under the statute to pay a bonus to their employees. The Act applies to factories with 10 or more workers and other establishments with 20 or more persons.

A bonus must be paid to all employees that earn a salary or wage up to INR 10,000 per month and that have worked for at least 30 days during the year. The minimum amount of bonus is 8.33% of salary or wages or INR 100 per annum, whichever is higher. The maximum bonus payable is 20% of salary or wage per annum.

Pensions

The Employees Provident Fund and Miscellaneous Provisions Act, 1952 provides for provident funds and pension contributions for certain establishments with 20 or more employees. In practice, several industries are covered under the provident fund laws. Employers and employees contribute 10% or 12% (depending upon the type of industry) of wages (i.e. basic wages, dearness allowance, retaining allowance and cash value of food concession) per month. From the employer's contribution, an



amount up to INR 6,500 per annum (8.33% of wages) goes towards the pension fund, and the balance towards the provident fund. Employees only contribute to the provident fund (12% of monthly salary).

Exemption from such contributions is provided to expatriates from countries that have concluded a social security agreement with India (currently Belgium, France, Germany, Luxembourg and Switzerland).

Health insurance

The Employee's Compensation Act, 1923 provides compensation for industrial accidents and occupational diseases resulting in disability and death. The minimum compensation payable by the employer is INR 120,000 for death and INR 140,000 for permanent total disability. The maximum is INR 914,160 for death and INR 1,096,992 for total disability.

The Act, which applies to factories that employ at least 10 persons, provides health insurance for industrial workers, for which employers contribute 4.75% of an employee's wages and employees contribute 1.75% on a monthly basis.

Other benefits

Share options are common in information technology, biotechnology, media, telecom sectors and banks. SEBI has issued the SEBI (Employee Stock Option Scheme and Employee Stock Purchase Scheme Guidelines (1999), which are applicable to listed companies. Companies are permitted to freely price the stock options, but must book the accounting value of options in their financial statements. The guidelines specify among others a one-year lock-in period, approval of shareholders by special resolution, formation of a compensation committee, accounting policies and disclosure in directors' reports.

The Payment of Gratuity Act, 1972 requires employers to pay a gratuity to workers who have rendered continuous service for at least five years at the time of retirement, resignation and superannuation at the rate of 15 days' wages for every completed year of service or part thereof in excess of six months up to a maximum of INR 1 million. The gratuity is payable at the same rate in case of death or disablement of workers even though the worker has not completed five years of continuous service.

3. Termination of employment

The Industrial Disputes Act, 1947 requires industrial establishments with 100 (the number may vary by state) or more employees to obtain government permission to close an operation. Employers must apply for permission at least 90 days before the intended closing date. If the government does not issue a decision within 60 days of the application, approval is deemed to be granted. An employer can apply to the relevant government agency to review its decision, or appeal to the Industrial Tribunal. Workers in an establishment closed illegally (i.e. without approval) remain entitled to full pay and benefits. The employer may appeal against the labor court or tribunal order to a higher court and during the appeal process, the reinstated worker remains entitled to 100% of wages.

Companies may use voluntary retirement schemes (VRSs) or redeployments. Beneficiaries under an approved VRS are exempt from tax on monetary benefits up to INR 500,000. Companies may amortize their VRS expenses over five years under the tax law.

4. Labor-management relations

With some exceptions, India has company unions rather than trade unions. These are often affiliated with national labor organizations. Various trade unions are promoted by political parties.

In manufacturing and other companies, prior discussions between management and labor leaders often help to forestall strikes. When strikes or disputes occur, they are usually settled by negotiation or through conciliation boards. It is common practice in many foreign-owned manufacturing companies to avert strikes by employing a labor welfare officer to act as a go-between for labor and management. By law, manufacturing companies with 500 or more workers must have one or more welfare officers who act as personnel manager, legal adviser on labor law and promote relations between factory

management and workers. In non-unionized companies in certain states, workers' representatives may be appointed to represent the workers.

The Industrial Disputes Act, 1947 requires industrial establishments with 100 or more workers to set up works committees consisting of representatives of employers and workers to promote measures for securing and preserving amity and good relations between the employer and workforce. Collective bargaining has gained ground in recent years, but agreements normally apply only at the plant level. Collective agreements are the norm in banking; such pacts may last up to five years.

At the central level, labor policies are managed jointly by the Indian Labor Conference and its executive body, the Standing Labor Committee, along with the various industrial committees. Representatives from the government, employers and labor are included in all three groups.

5. Employment of foreigners

Expatriate employment in manufacturing industries is generally limited to technical and specialized personnel. Many foreign affiliates have a few expatriates in India. Permission from the RBI or the government is not required to employ a foreign national, but the Ministry of Home Affairs, which grants visas and certain specific appointments, may require government approval in some cases. Foreigners entering India on a student, employment, research or missionary visa that is valid for more than 180 days are required to register with the Foreigners Registration Officer under whose jurisdiction they propose to stay within 14 days of arrival in India, irrespective of their actual period of stay. Foreigners visiting India on any other category of long-term visa, including a business visa that is valid for more than 180 days are not required to register if their actual stay does not exceed 180 days on each visit. If such a foreigner intends to stay in India for more than 180 days during a particular visit, he/she should register within the expiry of 180 days.

It normally takes about three months to obtain an immigration visa. The visa is generally granted for the same period as the employment contract. Once it is obtained, a stay permit is granted; this must be endorsed annually by the state government where the foreign national resides.

Expatriates are often paid salaries several times more than those of their Indian counterparts. Domestic private sector salaries are rising quickly, although they vary widely among industries.

The Ministry of Commerce and Industry has issued guidance clarifying that foreign nationals coming to India to execute projects or contracts are not covered under business visas and require employment visas. E-visa applications of foreign nationals working in India will be processed by the Indian missions abroad and will not be subjected to any quota restrictions. However, foreign nationals will have to draw a salary in excess of USD 25,000 to be eligible for an E-visa.



8.9 INTERNATIONAL TRANSFER PRICING

The history of transfer pricing is as old as that of international transactions or cross-border transactions. International transactions, to start with, were limited to production of one location and sale to independent parties in another or there were simple cases of import or export of raw materials and of finished goods traded between independent parties.

With the advent of industrial revolution and later on revolutions in transportation and communication, moving materials, labour, services and capital across geographical and political boundaries became easier and efficient. Companies expanded rapidly to open subsidiaries and affiliates resulting in emergence of Multinational Enterprises (MNEs), spread out in various countries.

An accompanying development has been the increasing volume of transactions within the group called intra-group transactions. The structure of transactions within an MNE group are determined by a combination of market driven forces and group policies, as against the open market conditions in case of independent entities. Surveys evidence that intra-group trade is growing steadily and possibly accounts for around 60 percent of global trade. The obvious consequence is that a large and growing number of intra-group transactions are no longer governed entirely by market forces, but by policies which are driven by common interests of the entities of a group.

Transfer pricing means pricing of goods and services supplied to associated enterprises that belong to the same business group. It concerns prices charged by an enterprise for transfer of goods and services to its related enterprise.

The Organization of Economic Cooperation and Development (OECD) defines "Transfer prices" as *"prices at which an enterprise transfers physical goods and intangibles or provides services to associated enterprises."*

Wherever a transaction takes place between two enterprises, whether related or unrelated, a price has to be fixed.

When a transaction is entered between two unrelated enterprises, the price in the normal course is fixed by negotiation based on open market conditions. The agreed prices for such transactions takes into consideration several factors, like demand and supply, geographical conditions, markets, available alternatives, etc. The negotiated price taking into consideration the market forces is known as price for supply of goods.

On the other hand, when a similar transaction takes place between associated enterprises, the price is set within a single enterprise where group interest may take precedence over the market conditions. As such the price for these transactions within the group is called the transfer price.

8.9.1. Objectives

The decision-making of the multinational enterprises are guided by the objective of profit-maximization with a corresponding reduction in overall tax liability. The pricing decision of a multinational enterprise is generally guided by the "group's objectives", which may differ from the objectives of the associated enterprises. Therefore, for them it is a management tool, whereby prices are fixed by enterprises with a view to shift profits to locations outside a taxation jurisdiction so that group as a whole earns minimum profits. Consequently, it is a mechanism for distributing revenue among related entities. The difference between market-determined prices and transfer prices arise mainly due to desire of multinational enterprises to increase overall global post-tax profits and reduce risk.

On the other hand, revenue authorities aim to maximize collections from tax in their respective geographical jurisdictions by enforcing the regulations and making adjustments which pose compliance problems.

8.9.2. Arm's Length Pricing – Techniques

What is Arm's Length Principle?

The arm's length principle seeks to ensure that transfer prices between members of an MNE ("controlled transactions"), which are the effect of special relationships between the enterprises, are either eliminated or reduced to a large extent. It requires that, for tax purposes, the transfer prices of controlled transactions should be similar to those of comparable transactions between independent parties in comparable circumstances ("uncontrolled transactions"). In other words, the arm's length principle is based on the concept that prices in uncontrolled transactions are determined by market forces and, therefore, these are, by definition, at arm's length. In practice, the "arm's-length price" is also called "market price". Consequently, it provides a benchmark against which the controlled transaction can be compared.

The Arm's Length Principle is currently the most widely accepted guiding principle in arriving at an acceptable transfer price. As circulated in 1995 OECD guidelines, it requires that a transaction between two related parties is priced just as it would have been if they were unrelated. The need for such a condition arises from the premise that intra-group transactions are not governed by the market forces like those between two unrelated entities. The principle simply attempts to place uncontrolled and controlled transactions on an equal footing.

Why Arm's Length Pricing?

The basic object of determining Arm's Length Price is to find out whether any addition to income is warranted or not, if the following situations arises:

- (a) Selling Price of the Goods < Arm's Length Price
- (b) Purchase Price > Arm's Length Price

Total Income as disclosed by an Assessee	XXXX
Add: Understatement of profit due to overstatement of purchase price	XXX
Add: Understatement of profit due to understatement of selling price	XXX
Total Income after Assessment	XXXX

Role of market forces in determining the "Arm's Length Price"

In case of transactions between Independent enterprises, the conditions of their commercial and financial relations(eg. The price of goods transferred or services provided and the conditions of the transfer or provision) are, ordinarily, determined by the market force.

Whereas,

In case of transactions between MNEs (Multinational Enterprises), their commercial and financial relations may not be affected by the external forces in the same way, although associated enterprises often seek to replicate the dynamics of the market forces in their dealings with each other.

Difficulties in applying the arm's length principle

The arm's length principle, although survives upon the international consensus, does not necessarily mean that it is perfect. There are difficulties in applying this principle in a number of situations.

- (a) The most serious problem is the need to find transactions between independent parties which can be said to be exact compared to the controlled transaction.
- (b) It is important to appreciate that in an MNE system, a group first identifies the goal and then goes on to create the associated enterprise and finally, the transactions entered into. This procedure obviously does not apply to independent enterprises. Due to these facts, there may be transactions within an MNE group which may not be between independent enterprises.



- (c) Further, the reductionist approach of splitting an MNE group into its component parts before evaluating transfer pricing may mean that the benefits of economies of scale, or integration between the parties, is not appropriately allocated between the MNE group.
- (d) The application of the arm's length principle also imposes a burden on business, as it may require the MNE to do things that it would otherwise not do (i.e. searching for comparable transactions, documenting transactions in detail, etc).
- (e) Arm's length principle involves a lot of cost to the group.

Transfer Pricing - Classification

In order to ensure that a transfer price meets the arm's length standard, the OECD (Organization for Economic Co-operation and Development) guidelines have indicated five transfer pricing methods that can be used. These methods fall in two categories:

(1) Traditional Transaction Methods:

- (a) Comparable Uncontrolled Price Method;
- (b) Resale Price Method;
- (c) Cost Plus Method

(2) Transactional Profit Methods:

- (a) Profit Split Method
- (b) Transaction Net Margin Method

[Details of Transfer Pricing- International Transactions dealt in Study Note .. of Paper 16 : Tax Management & Practice. Students are advised to refer to the practical illustrations to have a better understanding and knowledge on the gamut of these transactions]

8.9.3 Advance Pricing Agreements

One of the primary concerns of transfer pricing for businesses has been double taxation. The need for international consensus is served well by APAs (Advanced Pricing Agreements). Studies have shown that the use of APAs by tax payers continues to rise as the time taken for the approval of an APA decreases. The most popular countries using the APA are USA, UK and Australia.

The Mutual Agreement Procedure is dispute resolution mechanism found in tax treaties between countries. It is used in cases where a tax payer faces the risk of double taxation. The competent authority in one country enters into negotiations with its counterpart in the other. However, it is not guaranteed that the authorities will indeed come to an agreement. Furthermore, the tax payer is not allowed to be present at the discussions. The benefits of MAP are only available in cases where the relevant countries have entered into a treaty with each other.

8.9.4 Maximization of MNC's Income through Transfer Pricing Strategy

Within a multinational firm, it is not uncommon to transfer goods, services and loanable funds between the parent and an affiliate or between any two of its alliances. The transfer prices attached to these flows can be adjusted by the parent following certain methods that are supervised by the tax jurisdictions and other government authorities where the companies are incorporated. It is well documented that due to tax differences, import duties, quotas imposed by host countries and/or exchange restrictions or restrictions on ownership, it may be in the best interest of profit maximization to assign a higher/lower price to the transferred goods, services or funds than arm's length. In practice, multinationals do have the schemes in place to charge prices that are legitimate and that can be substantiated but also that may vary from their true values. The degree of arbitrariness in setting transfer prices depends on whether these products are traded in the open market. Even with traded products, it is possible to vary the transfer price by using different credit terms. Therefore, we may assume that the MNCs have

considerable leeway to adjust the level of transfer prices charged to their affiliates.

The arguments for and against transfer price schemes thus far have focused on profit maximization within regulations imposed by government authorities. The analyses have shown how to regulate transfer prices to increase after tax profits for the parent company in the presence of taxes, import duties, partial ownership and different dividend pay-out ratios.

There is a general agreement in corporate finance literature that the objective of the firm should be to maximize value. In a recent article:

(1) Jensen, following 200 years of research in economics and finance that sought to find the proper firm behavior to get the most out of the limited resources of the society, states the Value Maximization Proposition as:

"This house believes that in implementing organizational change, managers must have a criterion for deciding what is better, and better should be measured by the increase in long term market value of the firm."

Jensen continues to explain that in a simple world where all production runs are infinite and profits (cash flow streams) are level and perpetual, and hence the trade-off between current and future profits can be ignored, profit maximization rule can be a simpler alternative to achieve maximum social welfare. However, the real world is more complex because the input decisions are made now while the production and revenues occur in the future. Therefore a more appropriate objective function should show the trade-off between the present values of the future cash flows with the value of the inputs the society gives up now. The corporate finance implication is that the firm should expand inputs to the point where its market value is maximized in order to maximize social welfare.

(2) Jensen also notes that to create value, a firm does not need to find what the maximum value is since it would be impossible to do so in the complexity of the business environment. But, the firm has to know how to seek value by implementing strategies that will lead to enhance it.

With the above in mind, this paper will cast its arguments within a value-seeking framework. It will thus view transfer prices as a strategic tool that can create or destroy value for the firm, as it shifts revenues within the network of alliances of the parent.

As per analysis it reveals that, transfer prices will be a strategic tool used to exploit the benefits of financial arbitrage and differential taxes to increase the value of a multinational. Financial arbitrage is prevalent in a world where capital markets are effectively segmented due to direct and indirect investment barriers. Various studies reveals that direct barriers, such as taxes or restrictions on foreign ownership of domestic securities, as well as indirect barriers, such as differences in information, accounting statements, investor preferences or political risk, result in segmentation of international capital markets. The asset valuation implication of segmented markets is that each market assigns a different premium to the same risk. However, if the markets were integrated, assets with equal risk located in different countries would yield same expected returns in a common currency.

It may be noted that although financial arbitrage, a product of market segmentation, is partially caused by tax differences, tax differences is not the only and the major drive to have different risk premiums in different countries.

Financial arbitrage is a short-term trading strategy that takes advantage of price inefficiencies. It is the action of selling shares, currencies, etc. for a higher price in one market while buying them for a lower price in a different market, in order to make a profit quickly.

Tax Arbitrage is the practice of profiting from differences between the way transactions are treated for tax purposes. The complexity of tax codes often allows for many incentives which drive individuals to restructure their transactions in the most advantageous way in order to pay the least amount of tax. Some forms of tax arbitrage are legal while others are illegal.



Tax arbitrage can, for example, involve recognizing revenues in a low tax region while recognizing expenses in a high tax region. Such a practice would minimize the tax bill by maximizing deductions while minimizing taxes paid on earnings. It is suspected that tax arbitrage is extremely widespread, but by its nature, it is difficult to give precise figures as to what extent tax arbitrage is employed.

Based on the definition of financial arbitrage, it may be stated that, differential value of a foreign affiliate to a parent financed by equity is derived. This is the value difference of the foreign affiliate's cash flows between the foreign and domestic capital markets that are partially segmented. In this value differential equation, transfer prices become a decision variable that determines the value gain. Hence, the multinational should set the total transfer prices charged to its affiliate as to increase this value differential. There exists differential taxes for the countries that host the parent and the affiliate. The impact of the tax differences on differential values and the interactions between the two sources of arbitrage opportunities, namely financial and tax arbitrage will be explored.

The analysis of the various surveys reveals a number of results. Notably, in the base case where taxes are assumed away, transfer prices should be set high for an affiliate whose cash flows are negatively correlated with risk adjustment factors in the two markets. On the contrary, when cash flows of the subsidiaries are positively correlated to market risk adjustment factors, value is enhanced if transfer prices are set low. These results imply that financial arbitrage is another factor that multinationals can exploit by targeting the level of transfer prices they charge to their foreign affiliates. Moreover, these results imply that domestic equity financing of a foreign affiliate is only supported if the cash flows of the affiliate and exchange rates are positively correlated as is the case of import-based affiliates. On the contrary, in export-oriented foreign affiliates, foreign equity is the right financing vehicle.

When tax differences are introduced to the differential value model developed in the base case, the above results are modified in certain ways. In some cases, financial arbitrage and tax arbitrage impact the differential values in the same direction, but not always. In particular, in the case where tax differences are big and tax rate in the host country is low, tax arbitrage overturns the results and shifts the optimal level to high transfer prices. Surprisingly, this result also contradicts the well-known global tax minimization rule that whenever the host country tax rate is lower, income should be taxed in that jurisdiction as much as possible implying low transfer prices. A reversal in opposite direction is also observed in the case where tax rates in the host country are greater and the tax difference is again big. In this case, not high as would be implied by tax minimization objective but low transfer prices become optimal. This reversal in predicting the right transfer pricing scheme based on tax arbitrage hinges on the realization that tax shields are valuable for the parent and tax shields are greater larger the tax rate. If a parent can utilize the tax credit earned in a foreign affiliate in one jurisdiction with higher taxes against tax deficits in others, it turns out that increasing the taxable income in that high tax rate country is desirable.

The Valuation Model with Differential Corporate Taxes

Differences in corporate tax rates between the parent's home country and host country of the subsidiary is a major consideration in setting transfer prices. Profit maximization rule in the framework of this paper dictates that transfer prices should be set to maximize taxable income in the country with relatively lower corporate tax rate. For example, if the tax rate in host country is higher, the parent should set transfer prices high to reduce the taxable income under that jurisdiction and vice versa.

In a case, where, 100% equity raised either in the parent or the host country and 100% pay-out of dividends are assumed. Foreign dividend withholding tax is zero. There are no tariffs/duties and parent country allows for full foreign tax credit for taxes paid in host country. The parent has enough income from other sources to use the tax credits in full.

Multinationals have long used transfer pricing mechanisms to circumvent market imperfections brought about by government authorities such as tariffs, duties, exchange controls and blocked funds. Another well known use of transfer price schemes is to exploit tax arbitrage opportunities. The previous arguments on the benefits of moving income from one jurisdiction to another using transfer prices were

based on profit seeking incentives that implied that the taxable income in a high tax rate country be minimized to minimize the global tax liability. Minimization of global tax liability would be achieved by charging high transfer prices in the countries with high tax rates.

First, in a base case where taxes are assumed away it argues that in the presence of financial arbitrage alone, and in a case where cash flows of the subsidiary are positively correlated to risk adjustment factors, the parent should set transfer prices as low as possible to extract the most value.

Second, if the cash flows instead were negatively related to risk adjustment factors, the parent would benefit by setting transfer prices at their highest possible level. Moreover, when cash flows are positively correlated to exchange rates, as would be in the case of import-based subsidiaries, the subsidiary should be capitalized by parent equity to enhance value. This is not true for export-based subsidiaries where cash flows and exchange rates are negatively correlated. It is best to finance these subsidiaries using equity raised in the host country.

Exploring the extended model with tax differentials between the parent and the host country reveals some surprising reversals to the implications of profit seeking rule and to the conventional practice. The maxim that whenever the tax rate in the host country is lower/higher than that of the parent transfer prices should be set low/high is no longer universally true. Transfer pricing strategies depend on the size of tax differences and how they interact with financial arbitrage opportunities in the market. When tax differences are large enough and tax arbitrage effect is dominant, higher taxes in the host country becomes a factor that increases the present value of tax shields and lower transfer prices enhance that value gain. This gain is due to tax code allowances that allow excess tax credits earned from one affiliate to be applied against tax deficits from another affiliate. A set of testable propositions emerge from the findings of this paper. First, with segmented capital markets between the home and the host countries and with similar corporate tax rates, the positive effect of financial arbitrage on firm value will be larger for those parents who charge low (high) transfer prices to their affiliates with cash flows that are positively (negatively) correlated with risk adjustment factors. Second, when the tax differential between the parent and the host country is significantly large and the corporate tax rate is higher (lower) in the affiliate's country, the parents that charge their affiliates low (high) transfer prices will be more likely to have higher values compared to their matched counterparts that do the opposite. This second proposition stands in sharp contrast to predictions of conventional profit maximization dictum that says the parents have an incentive to charge high transfer prices in high tax environments in order to shift profits to low tax locations. A couple of caveats are in order while testing the above hypotheses. The predictions of this paper are valid for affiliates that are wholly owned and that operate in environments where import duties are insignificant. Also, the empirical investigation should show evidence of the effect on firm value of the choice of transfer pricing policy. Empirical results that show correlations between the level of transfer prices and tax rates will not be conclusive. Those correlations would simply show evidence of the practices followed by the decision makers in firms but would fail to show if those practices are value enhancing. Another restriction in testing the propositions of this paper is that the model overlooks agency costs. While the direct effect of choosing low/high transfer prices is to increase the after-tax value of the parent, these effects may be potentially offset in poorly-governed firms by increased opportunities for managers to manipulate income. Therefore, the results should be tested for firms with high-quality governance.

Details of Taxation issues relating to Transfer Pricing has been discussed in details in Paper 16 - Study Note - 22.



MISCELLANEOUS PROBLEMS

Illustration 1

On 25th March 2007, a customer requested his bank to remit DG 12,50,000 to Holland in payment of import of diamonds under an irrevocable LC. However due to bank strikes, the bank could affect the remittance only on 2nd April 2007. The inter bank market rates were as follows-

Place	25.03.2007	02.04.2007
Bombay [S/₹ 100]	2.2873 - 2.2962	2.3063 - 2.3159
London[US\$/Pound]	1.9120 - 1.9135	1.9050 - 1.9070
DG/Pound	4.1125 - 4.1140	4.0120 - 4.0130

The bank wishes to retain an exchange margin of 0.25%. How much does the customer stand to gain or lose due to the delay?

Solution:

1. Determination of Rupee Value of DG 1 on 25.03.2007

Process: Buy US \$ at Ask Rate at Bombay $\Rightarrow$ Buy Pound (using US \$) at Ask Rate at London
 $\Rightarrow$ Sell Pound at Bid Rate for DG

Therefore, ₹ / DG = Ask Rate at Bombay (for Purchase of Dollar) X Ask Rate for Pound at London (for Purchase of Pound) X Bid Rate for DG (for conversion of Pound into DG)

$$= 100/2.2873 \times 1.9135 \times (1/4.1125) = ₹ 20.34 \text{ per DG}$$

2. Determination of Rupee Value of DG 1 on 02.04.2007

Process: Buy US \$ at Ask Rate at Bombay $\Rightarrow$ Buy Pound (using US \$) at Ask Rate at London
 $\Rightarrow$ Sell Pound at Bid Rate for DG

Therefore, ₹ / DG = Ask Rate at Bombay (for Purchase of Dollar) X Ask Rate for Pound at London (for Purchase of Pound) x Bid Rate for DG (for conversion of Pound into DG)

$$= 100/2.3063 \times 1.9070 \times (1/4.0120) = ₹ 20.61 \text{ per DG}$$

3. Loss because of Delay

(a) Loss without considering Banker's Margin (Extra Money payable by the Company)

= Amount Payable x (Exchange Rate on the date of actual payment - Exchange Rate on the date on which payable)

$$= \text{DG } 12,50,000 \times (₹ 20.61 - ₹ 20.34) = ₹ 3,37,500$$

(b) Banker's Margin on Loss

$$= ₹ 3,37,500 \times 0.25\% = ₹ 844$$

(c) Total Loss to the Company = ₹ 3,37,500 + ₹ 844 = ₹ 3,38,344

Illustration 2

You have the following quotes from Bank A and Bank B —

	Bank A		Bank B	
Spot	USD/CHF	1.4650/55	USD/CHF	1.4653/60
3 Months		5/10		
6 Months		10/15		
Spot	GBP/USD	1.7645/60	GBP /USD	1.7640/50
		25/20		
		35/25		

Calculate —

- How much minimum CHF amount you have to pay for 1 Million GBP spot?
- Considering quotes from Bank A only, for GBP / CHF, what are the Implied Swap Points for spot over 3 months?

Solution:**1. Determination of Exchange Rates based on Cross Currency Quotes**

Note: The Cheapest Available Quote among Bank A and Bank B has been chosen wherever applicable.

For Buying GBP using CHF, the relevant rate is the ask rate for GBP in CHF

$$\begin{aligned}
 \text{Ask CHF / GBP} &= \text{Ask Rate CHF / USD} \times \text{Ask Rate USD / GBP} \\
 &= 1 / (\text{Bid Rate USD / CHF}) \times 1 / (\text{Bid Rate GBP / USD}) \\
 &= (1 \div 1.4653) \times (1 \div 1.7645) = 0.3868
 \end{aligned}$$

Therefore to buy 1 Million GBP, the required CHF = 10,00,000 X 0.3868 = CHF 386848.30

Similarly,

$$\begin{aligned}
 \text{Bid CHF / GBP} &= \text{Bid CHF / USD} \times \text{Bid USD / GBP} \\
 &= 1 / (\text{Ask Rate USD / CHF}) \times 1 / (\text{Ask Rate GBP / USD}) \\
 &= (1 \div 1.4655) \times (1 \div 1.7650) = 0.3866
 \end{aligned}$$

2. Determination of Swap Points based on Bank A Quotes alone**The Spot Rates for GBP/CHF -**

$$\begin{aligned}
 \text{Bid GBP/CHF} &= \text{Bid USD/CHF} \times \text{Bid GBP/USD} \\
 &= 1.4650 \times 1.7645 = 2.5850 \\
 \text{Ask GBP/CHF} &= \text{Ask USD / CHF} \times \text{Ask GBP / USD} \\
 &= 1.4655 \times 1.7660 = 2.5881
 \end{aligned}$$

The Futures Rates for GBP/CHF -

$$\begin{aligned}
 \text{Bid GBP /CHF} &= \text{Bid USD / CHF} \times \text{Bid GBP / USD} \\
 &= 1.4655 \times 1.7620 = 2.5822 \\
 \text{Ask GBP / CHF} &= \text{Ask USD / CHF} \times \text{Ask GBP / USD} \\
 &= 1.4665 \times 1.7640 = 2.5869
 \end{aligned}$$

The implied SWAP points is the difference between the Spot and Forward rates = **0.0028/0.0012 or 28/12.**



Illustration 3

Given the following -

\$/£	1.3670/1.3708
S.Fr/DEM	1.0030/1.0078
\$/S.Fr	0.8790 / 0.8803
And if DEM / £ in the market are 1.5560 /1.5576	

Find out if any arbitrage opportunity exists.

If so, show how \$10,000 available with you can be used to generate risk - less profit.

Solution:

1. Calculation of Cross Rate

$$\begin{aligned}
 \text{(a) Bid [DEM / £]} &= \text{Bid [\$ / £]} \times \text{Bid [S Fr. / \$]} \times \text{Bid [DEM / S Fr.]} \\
 &= \text{Bid [\$ / £]} \times 1 / \text{Ask [\$ / S Fr.]} \times 1 / \text{Ask [S Fr. / DEM]} \\
 &= 1.3670 \times 1 / 0.8803 \times 1 / 1.0078 \\
 &= 1.54086 \\
 \text{(b) Ask [DEM/£]} &= \text{Ask [\$ / £]} \times \text{Ask [S Fr./\$]} \times \text{Ask [DEM / S Fr.]} \\
 &= \text{Ask [\$ / £]} \times 1 / \text{Bid [\$ / S Fr.]} \times 1 / \text{Bid [S Fr. / DEM]} \\
 &= 1.3708 \times 1 / 0.8790 \times 1 / 1.0030 \\
 &= 1.55483
 \end{aligned}$$

	Cross Rate	Market Rate
DEM / £	1.54086 – 1.55483	1.5560 – 1.5576

Since both the rates are apart there exist an arbitrage opportunity.

1. Arbitrage

Relevant Rule for conversion: Based on nature of Quote (Direct or Indirect)

Nature of Quote	Buying Foreign Currency (Converting Home Currency into Foreign Currency)	Selling Foreign Currency (Converting Foreign Currency into Home currency)
Direct Quote, relevant rate is	Ask Rate	Bid Rate
Indirect Quote, relevant rate is	1 ÷ Bid Rate	1 ÷ Ask Rate

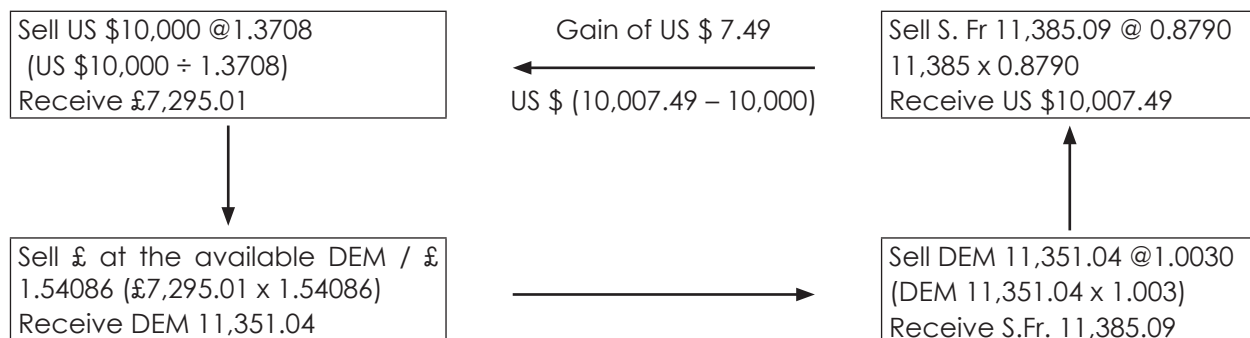


Illustration 4**Evaluation of Forward Premium – Encashing Foreign Currency Deposits –**

The following 2 – way quotes appear in the foreign exchange market –

	Spot Rate	1-Months Forward
₹ / US \$	₹ 46.00/ ₹ 46.25	₹ 47.00/ ₹ 47.50

Required –

- How many US Dollars should a firm sell to get ₹ 25 Lakhs after two months?
- How many Rupees is the firm required to pay to obtain US \$2,00,000 in the spot market?
- Assume the firm has US \$ 69,000 current account's earning interest. ROI on Rupee Investment is 10% p.a. should the firm encash the US \$ now 2 months later?

Solution:**1. US dollars for ₹ 25 Lakhs in the forward Market**

Action	Sell Foreign Currency in Forward Market
Relevant Rate	Forward Bid Rate = ₹ 47.00
US \$ Required to get ₹ 25,00,000	₹ 25,00,000 ÷ ₹ 47.00 = US \$ 53,191.49

2. ₹ Required to obtain US dollars 2,00,000 in the Spot Market

Action	Buy Foreign Currency in Spot Market
Relevant Rate	Spot Ask Rate = ₹ 46.25
Rupees Required to obtain \$2,00,000	US \$ 2,00,000 x ₹ 46.25 = US \$= ₹ 92,50,000

3. Evaluation of Investment in Rupee

$$\text{Forward Premium (for Bid Rates)} = \frac{\text{Forward Rate ₹47} - \text{Spot Rate ₹46}}{\text{Spot Rate ₹46}} \times \frac{12 \text{ Months}}{2 \text{ Months}} \times 100$$

$$= 13.04\%$$

Observation and conclusion Annualized Forward Premium for Bid Rates (13.04%) is greater than the Annual Return on Investment in Rupees (10%). Therefore, the firm should not encash its US \$ balance now. It should sell the US \$ in the forward market and encash them two months later.

Alternatively

Particulars	Encash Now	Encash 2 Months Later
Relevant Rate	Spot Bid Rate = ₹ 46.00	Forward Bid Rate = ₹ 47.00
₹ available for US \$ 69,000	₹ 31,74,000	₹ 32,43,000
Add: Interest for 2 Months (if converted now)	₹ 52,900 (31,74,000 x 10% X2/12)	Not Applicable
Amount Available after Two Months	₹ 32,26,900	₹ 32,43,000

Conclusion: Encashing two months later yields higher Rupee Return than encashing now and investing in Rupee Deposits. Therefore, the firm should wait for two months to encash under forward market.



Illustration 5

Ankita Papers Ltd (APL), on 1st July 2007 entered into a 3 Month forward contract for buying GBP 1,00,000 for meeting an import obligation. The relevant rates on various dates are-

Date	Nature of Quote	Quote
01.07.2007	Spot	₹ 81.50 - 81.85
	3-Month Forward	₹ 81.90 - 82.30
01.08.2007	Spot	₹ 82.10 - 82.40
	2-Month Forward	₹ 82.25 - 82.60
01.09.2007	Spot	₹ 81.70 - 82.05
	1-Month Forward	₹ 82.00 - 82.30
	2-Month Forward	₹ 82.40 - 82.70
01.10.2007	Spot	₹ 82.50 - 82.75
	1-Month Forward	₹ 82.60 - 82.90

Explain the further course of action if APL—

(a) Honours the contract on

- 01.10.2007
- 01.09.2007; and meets the import obligation on the same date.

(b) Cancels the contract on —

- 01.08.2007
- 01.09.2007
- 01.10.2007; as the import obligation does not materialize.

(c) Rolls over the contract for --

- 2 Months on 01.09.2007
- 1 Month on 01.10.2007; as the import obligation gets postponed to 01.11.2007. Also determine the cost / gain of that action. Ignore transaction costs.

Solution:

A. 3PL Honours the Contract

On (Date)	Action	Cost/ Gain
01.10.2007	No Further Action	NIL
01.09.2007	• Original deal (Buy Contract) should be cancelled. • Sell Forward: Therefore, APL should enter into a 1-Month Forward Contract for sale of GBP 1,00,000 at ₹ 82.00 (Forward Bid Rate) for reversal of original contract. • Settlement of Difference: Net difference between the original contract and the new contract should be settled i.e. GBP 1,00,000 X (3-Month Buy Rate (Ask Rate) as on 01.07.2007 ₹ 82.30 Less 1-Month Sell Rate (Bid Rate) as on 01.09.2007 ₹ 82.00) = ₹ 30,000 to be paid to the Banker. • Buy Spot: Buy GBP 1.00.000 at Spot Ask Rate of ₹ 82.05 and settle the import obligation.	Cost of Settlement ₹ 30,000.

B. APL Cancels the Contract

On (Date)	Action	Cost/Gain
01.08.2007	- Original deal (Buy Contract) should be cancelled. Sell Forward: Therefore, 3PL should enter into a 2-Month Forward Contract for sale of GBP 1,00,000 at ₹ 82.25 (Forward Bid Rate) for reversal of original contract. Settlement of Difference: Net difference between the original contract and the new contract should be settled i.e. GBP 1,00,000 X (3-Month Buy Rate (Ask Rate) as on 01.07.2007 ₹ 82.30 Less 2-Month Sell Rate (Bid Rate) as on 01.08.2007 ₹ 82.25) = ₹ 5,000 to be paid to the Banker.	Cost of Cancellation ₹ 5,000.

On (Date)	Action	Cost / Gain
01.09.2007	- Original deal (Buy Contract) should be cancelled. Sell Forward: Therefore, 3PL should enter into a 1-Month Forward Contract for sale of GBP 1,00,000 at ₹ 82.00 for reversal of original contract. Settlement of Difference: Net difference between the original contract and the new contract should be settled i.e. GBP 1,00,000 x (3-Month Buy Rate (Ask Rate) as on 01.07.2007 ₹ 82.30 Less 1-Month Sell Rate (Buy Rate) as on 01.09.2007 ₹ 82.00) = ₹ 30,000 to be paid to the Banker.	Cost of Cancellation ₹ 30,000.
01.10.2007	- Original deal (Buy Contract) should be cancelled. Sell Spot: Therefore, 3PL should sell GBP 1,00,000 at the Spot Bid Rate of ₹ 82.50 for reversal of original contract. Settlement of Difference: Net difference between the original contract and the spot sale contract should be settled i.e. GBP 1,00,000 x (3-Month Buy Rate-(Ask Rate) as on 01.07.2007 ₹ 82.30 Less Spot Bid Rate as on 01.10.2007 ₹ 82.50) = (₹ 20,000) i.e. ₹ 20,000 to be received from the Banker.	Gain on Cancellation ₹ 20,000.

C. APL Rolls Over the Contract for a further period of Two Months

On (Date)	Action	Cost / Gain
01.09.2007	- Original deal (Buy Contract) should be cancelled. Sell Forward: Therefore, 3PL should sell GBP 1,00,000 at the 1-Month Forward Bid Rate of ₹ 82.00 for reversal of original contract. Settlement of Difference: Net difference between the original 3-Month Forward Buy Contract and 1-Month Forward Sell Contract should be settled i.e. GBP 1,00,000 X (3-Month Buy Rate (Ask Rate) as on 01.07.2007 ₹ 82.30 Less 1-Month Sell Rate (Bid Rate) as on 01.09.2007 ₹ 82.00) = ₹ 30,000 i.e. ₹ 30,000 to be paid to the Banker. Buy Forward: 3PL should buy GBP 1,00,000 at 2-Month Forward Ask Rate of ₹ 82.70.	Cost of Roll Over ₹ 30,000.



01.10.2007	- Original deal (Buy Contract) should be cancelled. Sell Spot: Therefore, 3PL should sell GBP 1,00,000 at the Spot Bid Rate of ₹ 82.50 for reversal of original contract. Settlement of Difference: Net difference between the original 3-Month Forward Buy Contract and the Spot Bid Rate of ₹ 82.50 should be settled i.e. $\text{GBP } 1,00,000 \times (\text{3-Month Buy Rate (Ask Rate) as on 01.07.2007 ₹ 82.30 Less Spot Bid Rate as on 01.10.2007 ₹ 82.50}) = (\text{₹ } 20,000)$ i.e. ₹ 20,000 to be received from the Banker. Buy Forward: 3PL should buy GBP 1,00,000 at 1-Month Forward Ask Rate of ₹ 82.90.	Gain on Roll Over ₹ 20,000.

Illustration 6

Aradhya Ltd. (AL), on 1st January 2007 entered into a 3 Month forward contract for selling USD 1,00,000. The relevant rates on various dates are —

Date	Nature of Quote	Quote
01.01.2007	Spot	₹ 41.50 - 41.70
	3-Month Forward	₹ 42.40 - 42.80
01.02.2007	Spot	₹ 42.10 - 42.40
	2-Month Forward	₹ 42.30 - 42.60
	3-Month Forward	₹ 42.50 - 42.80
01.03.2007	Spot	₹ 41.00 - 41.40
	1-Month Forward	₹ 42.00 - 42.30
	2-Month Forward	₹ 42.40 - 42.70
01.04.2007	Spot	₹ 40.50 - 40.80
	1-Month Forward	₹ 40.80 - 41.00

Explain the further course of action if AL —

(a) Honours the contract on —

- 01.02.2007
- 01.03.2007
- 01.04.2007; and converts the Export Proceeds on the same date.

(b) Cancels the contract on —

- 01.02.2007
- 01.03.2007
- 01.04.2007; as the Export Proceeds did not materialize. .

(c) Rolls over the contract for—

- 3 Months on 01.02.2007
- 2 Months on 01.03.2007
- 1 Month on 01.04.2007; as the Export Proceeds will materialize only on 01.05.2007.

Also determine the cost / gain of that action. Ignore transaction costs.

Solution:**A. Honours the Contract**

On (Date)	Action	Cost / Gain
01.02.2007	- Original deal (Sell Contract) should be cancelled. Buy Forward: Therefore, AL should enter into a 2-Month Forward Contract for buying USD 1,00,000 at ₹ 42.60 (Forward Ask Rate) for reversal of original contract. Settlement of Difference: Net difference between the original 3-Month Forward Sell Contract and 2-Month Forward Buy Contract should be settled i.e. USD 1,00,000 x (3-Month Forward Sell Rate (Bid Rate) as on 01.01.2007 ₹ 42.40 Less 2-Month Forward Buy Rate (Ask Rate) as on 01.02.2007 ₹ 42.60) = (₹ 20,000) i.e. ₹ 20,000 to be PAID to Banker. Sell Spot: Sell the Export Proceeds of USD 1,00,000 at the Spot Bid Rate of ₹ 42.10.	Cost of Settlement ₹ 20,000.
01.03.2007	- Original deal (Sell Contract) should be cancelled. Buy Forward: Therefore, AL should enter into a 1-Month Forward Contract for buying USD 1,00,000 at ₹ 42.30 (Forward Ask Rate) for reversal of original contract. Settlement of Difference: Net difference between the original 3-Month Forward Sell Contract and 1-Month Forward Buy Contract should be settled i.e. USD 1,00,000 X (3-Mth Forward Sell Rate (Bid Rate) as on 01.01.2007 ₹ 42.40 Less 1-Mth Forward Buy Rate (Ask Rate) as on 01.03.2007 ₹ 42.30) = ₹ 10,000 i.e. ₹ 10,000 to be received from Banker. Sell Spot: Sell the Export Proceeds of USD 1,00,000 at the Spot Bid Rate of ₹ 41.00.	Gain on Settlement ₹ 10,000.
01.04.2007	No Further Action.	Nil

B. Cancels the Contract

On (Date)	Action	Cost / Gain
01.02.2007	- Original deal (Sell Contract) should be cancelled. Buy Forward: Therefore, AL should enter into a 2-Month Forward Contract for buying USD 1,00,000 at ₹ 42.60 (Forward Ask Rate) for reversal of original contract. Settlement of Difference: Net difference between the original 3-Month Forward Sell Contract and 2-Month Forward Buy Contract should be settled i.e. USD 1,00,000 X (3-Month Forward Sell Rate (Bid Rate) as on 01.01.2007 ₹ 42.40 Less 2-Month Forward Buy Rate (Ask Rate) as on 01.02.2007 ₹ 42.60) = (₹ 20,000) i.e. ₹ 20,000 to be paid to Banker.	Cost of Cancellation ₹ 20,000



On (Date)	Action	Cost / Gain
01.03.2007	- Original deal (Sell Contract) should be cancelled. Buy Forward: Therefore, AL should enter into a 1—Month Forward Contract for buying USD 1,00,000 at ₹ 42.30 (Forward Ask Rate) for reversal of original contract. Settlement of Difference: Net difference between the original 3-Month Forward Sell Contract and 1-Month Forward Buy Contract should be settled i.e. USD 1,00,000 x (3-Month Forward Sell Rate (Bid Rate) as on 01.01.2007 ₹ 42.40 Less 1-Month Forward Buy Rate (Ask Rate) as on 01.03.2007 ₹ 42.30) = ₹ 10,000 i.e. ₹ 10,000 to be Received from Banker.	Gain on Cancellation ₹ 10,000
01.04.2007	- Original deal (Sell Contract) should be cancelled. Buy Spot: Therefore, AL should buy USD 1,00,000 at the Spot Ask Rate ₹ 40.80 for cancellation of original contract. Settlement of Difference: Net difference between the original 3— Month Forward Sell Contract and Spot Buy Contract should be settled i.e. USD 1,00,000 X (3-Month Forward Sell Rate (Bid Rate) as on 01.01.2007 ₹ 42.40 Less Spot Ask Rate as on 01.03.2007 ₹ 40.80) = ₹ 1,60,000 i.e. ₹ 1,60,000 to be RECEIVED from Banker.	Gain on Cancellation ₹ 1,60,000

C.

Rolls Over the Forward Contract to 01.05.2007

On (Date)	Action	Cost / Gain
01.02.2007	- Original deal (Sell Contract) should be cancelled. Buy Forward: Therefore, AL should enter into a 2-Month Forward Contract for buying USD 1,00,000 at ₹ 42.60 (Forward Ask Rate) for reversal of original contract. Settlement of Difference: Net difference between the original 3-Month Forward Sell Contract and 2-Month Forward Buy Contract should be settled i.e. USD 1,00,000 X (3-Month Forward Sell Rate (Bid Rate) as on 01.01.2007 ₹ 42.40 Less 2-Month Forward Buy Rate (Ask Rate) as on 01.02.2007 ₹ 42.60) = (₹ 20,000) i.e. ₹ 20,000 to be paid to Banker. Sell Forward: AL should sell USD 1,00,000 at 3-Months Forward Bid Rate of ₹ 42.50.	Cost of Rollover ₹ 20,000.
01.03.2007	- Original deal (Sell Contract) should be cancelled. Buy Forward: Therefore, AL should enter into a 1-Month Forward Contract for buying USD 1,00,000 at ₹ 42.30 (Forward Ask Rate) for reversal of original contract. Settlement of Difference: Net difference between the original 3-Month Forward Sell Contract and 1-Mth Forward Buy Contract should be settled i.e. USD 1,00,000 x (3-Mth Forward Sell Rate (Bid Rate) as on 01.01.2007 ₹ 42.40 Less 1-Mth Forward Buy Rate (Ask Rate) as on 01.03.2007 ₹ 42.30) = ₹ 10,000 i.e. ₹ 10,000 to be Received from Banker. Sell Forward: AL should sell the export proceeds of USD 1,00,000 at 2-Months Forward Bid Rate of ₹ 42.40.	Gain on Rollover ₹ 10,000.

01.04.2007	- Original deal (Sell Contract) should be cancelled. Buy Spot: Therefore, AL should buy USD 1,00,000 at the Spot Ask Rate ₹ 40.80 for cancellation of original contract. Settlement of Difference: Net difference between the original 3-Month Forward Sell Contract and Spot Buy Contract should be settled i.e. $\text{USD } 1,00,000 \times (\text{3-Month Forward Sell Rate (Bid Rate) as on 01.01.2007 ₹ 42.40 Less Spot Ask Rate as on 01.03.2007 ₹ 40.80}) = ₹ 1,60,000$ i.e. ₹ 1,60,000 to be Received from Banker. Sell Forward: AL should sell export proceeds of USD 1,00,000 at 1 Month Forward Bid Rate of ₹ 40.80.	Gain on Rollover ₹ 1,60,000.

Illustration 7

On 01.04.2007, Sangeet International concluded a contract for purchase of 1,000,000 Blue Ray Discs from an American Company at \$1.48 per Disc, to be supplied over the next 3 Months. SI is required to make the payment immediately upon receipt of all the discs.

To meet the obligation, SI had booked a Forward Contract with its bankers to buy USD 3 Months hence. The following are the Exchange Rates on 01.04.2007 —

Spot	₹ 41.30 - 70
3 Months Forward	₹ 42.00 - 50

On 01.07.2007, the American Company expressed its inability to supply the last instalment of 300,000 Blue Ray Disks due to export restrictions in US, and requested SI to settle for the quantity supplied. Spot Rate on 01.07.2007 was ₹ 40.90 - 41.20.

- (a) Ascertain the total cash outgo for SI for purchase of 700,000 Discs.
 (b) Would total cash outgo undergo any change if the American Company had informed on 01.06.2007, when the following exchange rates were available —

Spot	₹ 41.70 - 42.20
1-Months Forward	₹ 42.10 - 42.50

Solution:

Cash Flow will be on two counts —

- Purchase of USD for settling supply of 700,000 Units of Blue Ray Disks.
- Cancellation of Forward Contract to the extent of purchase price of 300,000 Units.

1. American Company informs on 01.07.2007

Particulars	Amount
Amount to be paid for supply of 700,000 Units	
Purchase Cost of 7,00,000 Discs [7,00,000 X USD 1.48 per Disc]	USD 10,36,000
Rupee Outflow for Purchase of USD 10,36,000 [USD 10,36,000 X Forward Ask Rate of 42.50] [A]	₹ 4,40,30,000
Cost / Gain on cancellation of Forward Contract on due date [See Note]	
Purchase Cost of 3,00,000 Discs 3,00,000 x USD 1.48 per Disc	USD 4,44,000
Amount payable under Forward Contract for USD 4,44,000 at 3-Month Forward Ask Rate of ₹ 42.50	₹ 1,88,70,000
Less: Amount on selling USD 4,44,000 at Spot Bid Rate of ₹ 40.90 for cancellation	(₹ 1,81,59,600)
Cost/ (Gain) on Cancellation [B]	₹ 7,10,400
Total Cash Outflow for purchase of 7,00,000 Units of Blue Ray Discs [A + B]	₹ 4,47,40,400



Note: Sequence of Action if Forward Contract is cancelled on the due date —

- Original deal (Buy Contract) should be cancelled.
- **Sell Spot:** Therefore, SI should sell USD 4,44,000 at the Spot Bid Rate ₹ 40.10 for
- cancellation of original contract on 01/07/2007.
- **Settlement of Difference:** Net difference between the original 3-Month Forward Buy Contract and Spot Sale Contract should be settled i.e.

⇒ USD 4,44,000 x (3-Month Forward Buy Rate (Ask Rate) as on 01.04.2007 **Less** Spot Bid Rate as on 01.07.2007)

⇒ ₹ **7,10,400** [i.e. ₹ 4,44,000 x (42.50 - 40.90) **to be Paid to Banker.**

2. American Company informs on 01.06.2007

Particulars	Amount
Amount to be paid for supply of 700,000 Units (As above) [A]	₹ 4,40,30,000
Cost/Gain on cancellation of Forward Contract on 01.06.2007 [See Note]	
Purchase Cost of 300,000 Discs 3,00,000 X USD 1.48 per Disc]	USD 4,44,000
Amount payable on cancellation of Forward Contract for USD 4,44,000 at 3-Month Forward Ask Rate of ₹ 42.50	₹ 1,88,70,000
Less: Amount receivable on selling USD 4,40,000 at 1-Month Forward Bid Rate of ₹ 42.10 for cancellation as on 01.06.2007	(₹ 1,86,92,400)
Cost/ (Gain) on Cancellation [B]	₹ 1,77,600
Total Cash Outflow for purchase of 7,00,000 Units of Blue Ray Discs [A + B]	₹ 4,42,07,600

Note: Sequence of Action if Forward Contract is cancelled before the due date —

- Original deal (Buy Contract) should be cancelled.
- Sell Forward: Therefore, SI should enter into a 1-Month Forward Contract for sale of USD 4.44,000 at ₹ 42.10 for reversal of original contract.
- Settlement of Difference: Net difference between the original contract and the new contract should be settled i.e.

⇒ USD 4,44,000 x (3-Month Forward Buy Rate (Ask Rate) as on 01.04.2007 ₹ 42.50 **Less** 1 Month Forward Sell Rate (Bid Rate) as on 01.06.2007 ₹ 42.10)

⇒ ₹ **1,77,600 to be Paid to the Banker.**

Illustration 8

Sunny Ltd. (SL), have exported goods to UAE for Universal Apparatus (UA) 5,00,000 at a credit period of 90 days. Rupee is appreciating against the UA and SL is exploring alternatives to mitigate loss due to UA Depreciation. From the following information, analyze the possibility of Money Market Hedge —

Foreign Exchange Rates		
	Bid	Ask
Spot	₹ 11.50	₹ 11.80
3-Month Forward	₹ 11.20	₹ 11.40

Money Market Rates		
	Deposit	Borrowings
UA	9%	12%9%
Rupees	8%	10%8%

Solution:

Facts: SL will sell UA 5,00,000 in 3 Months

Evaluation: Money Market Hedge is possible only if the 3-Month Forward Rate is lower than value of Spot Bid in the next three 3 Months (computed by applying UA Borrowing Rate and Rupee Deposit Rate).

Value of Spot Bid

$$\begin{aligned}
 \text{In 3 Month's Time} &= \text{Spot Bid Rate} \times \frac{(1 + \text{Rupee Deposit Rate for 3 Months})}{(1 + \text{AED Borrowing Rate for 3 Months})} \\
 &= ₹11.50 \times \frac{(1 + 8\% \text{ p.a. for 3 Months})}{(1 + 12\% \text{ p.a. for 3 Months})} \\
 &= ₹11.50 \times (1 + 0.02) \div (1 + 0.03) = ₹11.37
 \end{aligned}$$

Value of Spot Bid ₹11.37 in 3 Month's time > Forward Bid Rate of ₹11.20

⇒ Therefore, there is a possibility for Money Market Hedge

Inference: ⇒ UA 5,00,000 Receivable is an Asset

⇒ Under Money Market Hedge, liability in UA should be created

⇒ SL should borrow UA for 3 Months, which along with interest would amount to UA 5,00,000 in 3 Months.

Action	Date	Activity
Borrow	Now	Borrow an amount of UA at 12% p.a. for 3 Months so that, the total liability including interest for 3 months, is UA 5,00,000. ⇒ $UA\ 5,00,000 \div (1 + \text{Interest Rate for 3 Months})$ ⇒ $UA\ 5,00,000 \div (1 + 12\% \times 3 \text{ Months} / 12 \text{ Months})$ ⇒ $UA\ 5,00,000 \div 1.03 = UA\ 4,85,436.8932$ should be borrowed.
Convert	Now	Convert UA 98,765.4321 into Rupees at Spot Rate (Bid Rate since UA is sold) ⇒ $UA\ 4,85,436.8932 \times ₹11.50 = ₹55,82,524$
Invest	Now	Invest ₹55,82,824 in Rupee Deposit for 3 Months at 8% p.a.
Realize	3 Months hence	Realize the maturity value of rupee deposit. Amount received will be - ⇒ $₹55,82,524 \times (1 + \text{Interest Rate for 3 Months})$ ⇒ $₹55,82,524 \times (1 + 8\% \times 3 \text{ Months} / 12 \text{ Months})$ ⇒ $₹55,82,524 \times (1 + 0.02) = ₹55,82,524 \times 1.02 = ₹56,94,175$
Receive	3 Months hence	Receive the UA 5,00,000 from the customer abroad.
Repay	3 Months hence	Repay the UA Loan using the money received from the customer abroad. Amount Payable = Amount Borrowed UA 4,85,436.8932 X (1 + 12% p.a. for 3 Months) = USD 4,85,436.8932 x 1.03 = UA 5,00,000.

2. Amount Saved by Utilizing Money Market Hedge

Action: Enter into a 3-Month Forward Sale Contract for sale of UA 5,00,000 at ₹11.20. Sell UA 5,00,000 3 Months from now at ₹11.20



Effect: Amount in ₹ in hand in 3 Months = UA 5,00,000 X ₹ 1 1.20
= ₹ 56,00,000

Amount Saved under Money Market Hedge

Under Money Market Hedge is ₹ 56,94,175

Less: Under Forward Contract is ₹ 56,00,000

Amount Saved ₹ 94,175

Conclusion: Hedging risks using Money Market Operations will be advantageous to SL.

Illustration 9.

The following table shows interest rates and exchange rates for the US Dollar and French Franc. The spot exchange rate is 7.05 Francs per Dollar. Complete the missing entries —

	3 Months	6 Months	1 Year
Eurodollar Interest Rate (Annual)	11½%	12¼%	?
Euro Franc Interest Rate (Annual)	19½%	?	20%
Forward Francs per Dollar	?	?	7.52
Forward Discount on Franc (Percent per Year)	?	(6.3%)	?

Solution:

Particulars	3 Months	6 Months	1 Year
Euro Dollar Interest Rate (Annual)	11½%	12¼%	12½%
Euro Franc Interest Rate (Annual)	19½%	18.94%	20%
Forward Francs per Dollar	7.1871	7.2721	7.52
Forward Discount on Franc (Percent per Year)	(7.78%)	(6.3%)	6.67%

Working Notes:

- Spot Rate 1 \$ = 7.05 Francs
- 3 Months Forward; (for \$ 1)
= Spot Rate x [(1 + Francs Interest Rate for 3 Months) / (1 + Euro Dollar Interest Rate for 3 Months)] =
7.05 Francs X [(1 + 19.5%/4) / (1 + 11.5%/4)] = Fr. 7.1871 [Interest Rate Parity Method]
- Forward Discount Rate [3 Months]
= [(Forward Rate - Spot Rate) / Spot Rate] x 100 x 12/No. of Months' Forward Rate
= (7.1871 - 7.05)/7.05 X 100 X 12/3 = 7.78% (Annualized)
- 6 Months Forward Rate;
= Spot Rate X [1 + (Discount Rate X No. of Months Forward/ 12)]
= Fr. 7.05 X [1 + (6.3% X 6/12)]
= Fr. 7.05 x [1 + 0.0315] = Fr. 7.2721
- Franc Interest Rate [6 Months] = Assuming Franc Interest Rate = x, applying the same in Interest Rate Parity Formula for determining Forward Rate —

$$\text{Forward Rate} = \text{France Spot Rate} \times \frac{(1 + \text{Francs Interest Rate for 6 Months})}{(1 + \text{Euro Dollar Interest Rate for 6 Months})}$$

$$\text{Fr. 7.2721} = \text{Fr. 7.05} \times (1 + x/2) / (1 + 12.25\%/2)$$

$$\text{Fr. 7.2721} = \text{Fr. 7.05} \times (1 + x/2) / (1 + 0.6125);$$

$$1 + x/2 = \text{Fr. 7.2721} \times 1.06125 / \text{Fr. 7.05}$$

$$X/2 = 1.0947 - 1 = 0.0947 \text{ or } 9.47\%$$

$$X = 18.94\%$$

6. Euro Interest Rate [6 Months] = Assuming Euro Interest Rate = x, applying the same in Interest Rate Parity Formula for determining Forward Rate —

$$\text{Forward Rate} = \text{Franc Spot Rate} \frac{(1 + \text{Francs Interest Rate for 1 Year})}{(1 + \text{Euro Dollar Interest Rate for Year})}$$

$$\text{Fr.7.52} = \text{Fr. 7.05} \times (1 + 20\%) / (1 + x)$$

$$\text{Fr.7.52} = \text{Fr. 7.05} \times (1 + 0.2) / (1 + x);$$

$$1 + x = \text{Fr.7.05} \times 1.2 / \text{Fr.7.52}$$

$$x = 1.125 - 1 = 0.125 \text{ or } 12.50\%$$

7. Forward Discount Rate:

$$= [\text{Forward Rate} - \text{Spot Rate}] / [\text{Spot Rate}] \times 100 \times 12 / \text{No. of Months Forward}$$

$$= (7.52 - 7.05) / 7.05 \times 100 \times 12 / 12 \text{ Months} = 0.0667 \text{ or } 6.67\%$$

Illustration 10.

Following information is made available —

Spot rate for 1 US \$	₹ 48.0123
180 -Days Forward rate for 1 US \$	₹ 48.8190
Annualized Interest Rate for 6 Months - Rupee	12%
Annualized Interest Rate for 6 Months - US \$	8%

Is there any arbitrage possibility? If yes how an arbitrageur can take advantage of the situation, if he is willing to borrow ₹ 40,00,000 or US \$ 83,312?

Solution:

1. Direction of Cash Flow

(Based on Interest Rate Parity Theory)

Particulars	Value
Forward Rate	₹ 48.8190
For the above forward rate, theoretical 6-Month interest for Rupee is - $= \frac{\text{Forward Rate} \times (1 + 8\% \times 6 \text{ Months} / 12 \text{ Months})}{\text{Spot Rate}} - 1$ $= \frac{₹ 48.819 \times (1 + 8\% \times 6 \text{ Months} / 12 \text{ Months})}{₹ 48.0123} - 1$ $= \frac{₹ 48.819 \times (1 + 4\%)}{₹ 48.0123} - 1 = [(₹ 48.819) \times 1.04] \div ₹ 48.0123 = 50.7718 \div 48.0123 - 1$ $= 1.0575 - 1 = 0.0575 \text{ or } 5.75\%$ Annual Interest Rate $5.75\% \times 12 \text{ Months} / 6 \text{ Months} = 11.50\%$	11.50%
Prevailing Interest Rate	12%
In comparison to theoretical interest rate, the actual rate is -	Higher
Therefore, money will flow—	Into India

Conclusion: Since the theoretical interest rate and the actual interest rate differ, arbitrage possibility exists by borrowing in USD and investing in Rupee.



2. Sequence of Activities for Gain

Action	Date	Activity
Borrow	Now	Borrow USD 83,312 at 8% p.a. for 6 Months
Convert	Now	Convert USD 83,312 at Spot Rate $\Rightarrow$ USD 83,312 $\times$ ₹ 48.0123 = ₹ 40,00,000
Invest	Now	Invest ₹ 40 LAKHS in Rupee Deposit for 6 Months at 12% p.a.
Realize	6 Months Later	Realize the maturity value of rupee deposit. Amount received will be - $\Rightarrow$ ₹ 40,00,000 $\times$ (1 + Interest Rate for 6 Months) $\Rightarrow$ ₹ 40,00,000 $\times$ (1 + 12% $\times$ 6 Months / 12 Months) $\Rightarrow$ ₹ 40,00,000 $\times$ (1 + 1.06) = ₹ 42,40,000
Convert	6 Months Later	Convert maturity proceeds of ₹ 42,40,000 at Forward Rate of ₹ 48.8190 $\Rightarrow$ ₹ 42,40,000 $\div$ ₹ 48.8190 = USD 86,851.43
Repay	6 Months Later	Repay the USD Loan from the conversion out of money received on conversion. Amount Payable = Amount Borrowed USD 83,312 $\times$ (1 + 8% p.a. for 6 Months) = USD 83,312 $\times$ 1.04 = USD 86,644.48
Gain	6 Months Later	Conversion of Maturity Proceeds Less Loan Repaid = USD 86,851.43 - USD 86,644.48 = USD 206.95 or ₹ 10,103 [USD 206.95 converted at Forward Rate]

Illustration 11.

A Laptop Bag is priced at \$ 105.00 at New York. The same bag is priced at ₹ 4,250 in Mumbai. Determine Exchange Rate in Mumbai.

- (a) If, over the next one year, price of the bag increases by 7% in Mumbai and by 4% in New York, determine the price of the bag at Mumbai and New York? Also determine the exchange rate prevailing at New York for ₹ 100.
- (b) Determine the appreciation or depreciation in Re. in one year from now.

Solution:

1. Exchange Rate in Mumbai (Purchasing Power Parity Theory)

$$\begin{aligned}\text{Exchange Rate in Mumbai per \$} &= \text{Bag Price in ₹ at Mumbai} / \text{Bag Price in \$ at New York} \\ &= ₹ 4,250 \div \text{USD } 105 = ₹ 40.4762\end{aligned}$$

2. Price in a Year's time

$$\begin{aligned}\text{Mumbai} &= \text{Prevailing Price} \times (1 + \text{Increase in Rate}) = ₹ 4250 \times (1 + 7\%) \\ &= ₹ 4,250 \times 1.07 = ₹ 4,547.50\end{aligned}$$

$$\begin{aligned}\text{New York} &= \text{Prevailing Price} \times (1 + \text{Increase in Rate}) = \text{USD } 105 \times (1 + 4\%) \\ &= \text{USD } 105 \times 1.04 = \text{USD } 109.20\end{aligned}$$

3. Exchange Rate in New York (after one year)

Exchange Rate in New York per ₹ 100

$$= \text{Bag Price in \$ at New York} / \text{Bag Price in ₹ at Mumbai} \times ₹ 100$$

$$= (\text{USD } 109.20 \div ₹ 4,547.50) \times ₹ 100 = \text{USD } 2.4013$$

4. Depreciation (in %) of Re. over the year

$$\text{Depreciation} = [(1 + \text{Indian Inflation Rate}) / (1 + \text{New York Inflation Rate})] - 1$$

$$= [(1 + 7\%) / (1 + 4\%)] - 1 = 1.07 / 1.04 - 1 = 2.88\%$$

$$\text{Alternatively} = (\text{Future Spot Rate } ₹ / \$ - \text{Spot Rate of } ₹ / \$) \div \text{Spot Rate} \times 100$$

$$\begin{aligned} \text{Future Spot} &= \text{Bag Price in Mumbai} / \text{Bag Price in New York in one year} = ₹ 4,547.50 / \text{USD } 109.20 \\ &= ₹ 41.6438 \end{aligned}$$

$$\begin{aligned} \text{Depreciation} &= (\text{Future Spot } ₹ 41.6438 - \text{Spot Rate } ₹ 40.4762) \div \text{Spot Rate } ₹ 40.4762 \times 100 \\ &= ₹ 1.1676 \div ₹ 40.4762 \times 100 = 2.88\% \end{aligned}$$

Illustration 12.

₹ / GBP	82.60/90	Interest Rates (Annualized)	India	London
3 Months Forward	20/70	3 Months	8%	5%
6 Months Forward	50/75	6 Months	10%	8%

Verify whether is any scope for covered interest arbitrage by borrowing in rupee.

Solution:

Particulars	3 Months	6 Months
A. Outflow at the end of the period	1,00,000	1,00,000
Amount Borrowed in ₹	2,000	5,000
Add: Interest Payable-	(1,00,000 x 8% X 3 / 12)	(1,00,000 x 10% x 6 / 12)
Total Outflow at the end of the period [A]	1,02,000	1,05,000
B. Inflow at the end of the Period:		
(a) GBP obtained by converting money borrowed at Spot Rate [Ask Rate]	GBP 1,206.2726 (₹ 1,00,000/82.90)	GBP 1,206.2726 (₹ 1,00,000/ 82.90)
(b) Invest the GBP 1206.2726 @	5% p.a. for 3 Months	8% p.a. for 6 Months
(c) Interest Receivable at the end of the period	GBP 15.0784 (GBP 1,206.2726 x 5% x 3 / 12)	GBP 48.2509 (GBP 1,206.2726 x 8% x 6 / 12)
d) Total Amount Receivable in GBP at the end of the period [a + c]	GBP 1,221.3510	GBP 1,254.5235
(e) Forward Rate [Bid Rate]	₹ 82.80 [₹ 82.60 + 0.20 Premium]	₹ 83.10 [₹ 82.60 + 0.50 Premium]
(f) Convert GBP Received in Re. at Forward Rate [d X e] [B]	₹ 1,01,128 [₹ 82.80 x GBP 1,221.3510]	₹ 1,04,251 [₹ 83.10 x GBP 1,254.5235]
C. Total Cash Loss [A-B]	₹ 872	₹ 749
D. Cash Loss in % of Money Invested	0.872% [₹ 872 / ₹ 1,00,000]	0.749% [₹ 749 / ₹ 1,00,000]

Conclusion: Amount of rupee received is less than the amount repaid, there is no scope for Covered interest arbitrage by borrowing in Rupee.



Alternative Approach:

The above conclusion can be derived by the comparing Estimated Future Value per GBP Invested in lines with Interest Rate Parity Analysis (using Spot Ask Rate) and Forward Rate Quoted (Bid Rate) as follows —

Particulars	3 Months	6 Months
A. Forward Rate [Bid Rate] Rate at which GBP can be sold	₹ 82.80 [₹ 82.60 + 0.20 Premium]	₹ 83.10 [₹ 82.60 + 0.50 Premium]
B. Estimated Future Value [Under Interest Rate Parity Analysis]	$\frac{₹ 82.90 \times (1 + 8\% \times 3/12)}{(1 + 5\% \times 3/12)}$ = ₹ 83.5141	$\frac{₹ 82.90 \times (1 + 10\% \times 6/12)}{(1 + 8\% \times 6/12)}$ = ₹ 83.6971
C. Loss per GBP Invested [without removing effect of interest on Investment] [B-A]	₹ 0.7141	₹ 0.5971
D. Interest on Loss per GBP Invested	₹ 0.0089 [₹ 0.7141 × 5% × 3/12]	₹ 0.5971 [₹ 0.5971 × 8% × 6/12]
E. Loss per GBP Invested [after removing effect of interest on GBP Investment] [C + D]	₹ 0.7230	₹ 0.6210
F. Loss per GBP Invested (in %) [E / A]	0.872% [₹ 0.7230 / ₹ 82.90]	0.749% [₹ 0.6210 / ₹ 82.90]

Note: Decision can be arrived at by comparing Figures in B with Figures in A. Since the Estimated Future Value [applying Interest Rate Parity Analysis on Spot Rate - Ask Rate] is higher than the Forward Rate [Bid Rate], there is no scope of Covered Interest Arbitrate.

Step C through F is provided to illustrate that the net effect under both the approaches are the same.

Illustration 13.

An exporter is a UK based company. Invoice amount is \$3,50,000.

Credit period is three months.

Exchange rates in London		Rate of interest in money market		
Particulars	Exchange rate	Currency	Deposit	Loan
Spot Rate (\$/£)	1.5865 -1.5805	\$	7%	9%
3 Month forward rate (\$/£)	1.6100 -1.6140	£	5%	8%

Compute and show how a money market hedge can be put in place.

Compare and contrast the outcome with a forward contract.

Solution:

The Given Quotes are indirect Quotes for the USD in terms of GBP. The same when converted in terms of GBP per USD (£/\$) using the formula Bid Rate = (1 ÷ Ask Rate) is as follows -

Spot Rate (£/\$) 0.6287- 0.6303

3-month Forward Rate (£/\$) 0.6196-0.6211

Facts: The Exporter sell USD 3,50,000 in 3 Months

Evaluation: Money Market Hedge is possible only if the 3-Month Forward Rate is lower than value of Spot Bid in the next three 3 Months (computed by applying USD Borrowing Rate and GBP Deposit Rate).

Value of Spot Bid in 3

$$\text{Month's Time} = \text{Spot Bid Rate} \times \frac{(1 + \text{GBP Deposit Rate for 3 Months})}{(1 + \text{USD Borrowing Rate for 3 Months})}$$

$$= ₹ 0.6287 \times \frac{(1 + 5\% \text{ p.a. for 3 Months})}{(1 + 9\% \text{ p.a. for 3 Months})}$$

$$= ₹ 0.6287 \times (1 + 0.0125) \div (1 + 0.0225) = \text{USD } 0.6226$$

Value of Spot Bid USD 0.6226 in 3 Month's time > Forward Bid Rate of USD 0.6196

⇒ Therefore, there is a possibility for Money Market Hedge

Inference: ⇒ USD 3,50,000 Receivable is an Asset O Under Money Market Hedge, liability in USD should be created

⇒ The Exporter should borrow USD for 3 Months, which along with interest would amount to USD 3,50,000 in 3 Months.

Action	Date	Activity
Borrow	Now	Borrow an amount of USD at 9% p.a. for 3 Months so that, the total liability including interest for 3 months, is USD 3,50,000. ⇒ $\text{USD } 3,50,000 \div (1 + \text{Interest Rate for 3 Months})$ ⇒ $\text{USD } 3,50,000 \div (1 + 9\% \times 3 \text{ Months} / 12 \text{ Months})$ ⇒ $\text{USD } 3,50,000 \div 1.0225 = \text{USD } 3,42,298.2885$ should be borrowed.
Convert	Now	Convert USD 3,42,298.2885 into Rupees at Spot Rate (Bid Rate since USD is sold) ⇒ $\text{USD } 3,42,298.29 \times 0.6287 = \text{GBP } 2,15,202.93$
Invest	Now	Invest GBP 2,15,202.93 in Pound Deposit for 3 Months at 5% p.a.
Realize	3 Months Hence	Realize the mature value of pound Deposit, Amount received will be – ⇒ $\text{GBP } 2,15,202.93 \times (1 + \text{Interest Rate for 3 Months})$ ⇒ $\text{GBP } 2,15,202.93 \times (1 + 5\% \times 3 \text{ Months} / 12 \text{ Months})$ ⇒ $\text{GBP } 2,15,202.93 \times (1 + 0.0125) = \text{GBP } 2,17,892.97$
Receive	3 Months Hence	Receive the USD 3,50,000 from the customer abroad.
Repay	3 Months Hence	Repay the USD Loan using the money received from the customer abroad. Amount Payable = Amount Borrowed USD 3,42,298.2885 x (1 + 9% p.a. for 3 Months) = USD 3,42,298.2885 x 1.0225 = USD 3,50,000.

Amount Saved by Utilizing Money Market Hedge

Action: Enter into a 3-Month Forward Sale Contract for sale of USD 3,50,000 at 0.6196

Sell USD 3,50,000, 3 Months from now at 0.6196

Effect: Amount GBP in hand in 3 Months = USD 3,50,000 x 0.6196 = GBP 2,16,860

Amount Saved under Money Market Hedge

Under Money Market Hedge is GBP 2,17,893

Less: Under Forward Contract is GBP 2,16,860

Amount Saved **GBP 1,033.00**

Conclusion: Hedging risks using Money Market Operations will be advantageous to the exporter.



Illustration 14

An Indian Company Mukta Ltd. has availed the services of two London based Interior Decorators and are required to pay GBP 50,000 in 3 Months. From the following information, advice the course of action to minimize rupee outflow -

Foreign Exchange Rates (₹ / GBP)		
	Bid	Ask
Spot	₹ 81.60	₹ 81.90
3 – Months Forward	₹ 82.70	₹ 83.00

Money Market Rates (p.a.)		
	Deposit	Borrowings
GBP	6%	9%
Rupees	8%	12%

Solution:

1. Money Market Hedge vs. Hedging under Forward Contract

Facts: The Indian Company will buy GBP 50,000 in 3 Months

Evaluation: The Indian Company will buy GBP 50,000 in 3 Months

Money Market Pledge is possible only if —

Net Amount repayable for Rupee Borrowings for Rupee Payable per GBP under
every GBP Invested [Based on Spot Ask Rate] < Forward [Forward Ask Rate]

Outflow per GBP in 3 Month's Time [based on Spot Ask]

$$\begin{aligned}
 &= \text{Spot Ask Rate} \times \frac{(1 + \text{Rupee Borrowing Rate for 3 Months})}{(1 + \text{GBP Deposit Rate for 3 Months})} \\
 &= ₹ 81.90 \times \frac{(1 + 12\% \text{ p.a. for 3 Months})}{(1 + 6\% \text{ p.a. for 3 Months})} \\
 &= ₹ 81.90 \times (1 + 0.03) \div (1 + 0.015) = ₹ \mathbf{83.11}
 \end{aligned}$$

Liability per GBP Invested (Rupee Equivalent Borrowed) in 3 Month's time ₹ 83.11 is Greater Than Forward Ask Rate Of ₹ 83.00.

⇒ Therefore, there is no possibility for Money Market Hedge

Effective Cost under Money Market Hedge

Rate of Interest on Borrowing (after adjusting for interest on deposits):

$$\begin{aligned}
 &= \left(\frac{(1 + \text{Rupee Borrowing Rate for 3 Months})}{(1 + \text{GBP Deposit Rate for 3 Months})} - 1 \right) \times 100 \times \frac{12 \text{ Months}}{\text{No. of Months}} \\
 &= \left(\frac{(1 + 12\% \times 3/12 \text{ Months})}{(1 + 6\% \times 3/12 \text{ Months})} - 1 \right) \times 100 \times \frac{12 \text{ Months}}{3 \text{ Months}} \\
 &= [(1.03 / 1.015) - 1] \times 100 \times 4 = 5.91\%
 \end{aligned}$$

Inference: Net Rupee Outflow under Forward Contract will be lesser than outflow under Money Market Hedge. Therefore, Forward Contract should be preferred.

1. Forward Market Hedge vs. Spot Payment by Borrowing in Rupee

Logic: Spot payment by borrowing in Rupee is beneficial only if —

Appreciation Rate for Forward Rate
(i.e. Premium % on Forward Quote) > Rate of Interest for Borrowing
(Borrowing Cost)

Evaluation:

Particulars	%
Premium on Forward Quote (Ask Rate) [Annualized]	
$\Rightarrow [(Forward Rate - Spot Rate) / Spot Rate] \times 100 \times 100 \times 12 / \text{No. of Months Forward}$	5.37%
$\Rightarrow [(\text{₹ } 83.00 - \text{₹ } 81.90) / \text{₹ } 81.90] \times 100 \times 12 / 3 \text{ Months}$	
Rate of Interest for Rupee Borrowings [Annualized Given]	12%

Inference: GBP appreciation rate is lower than the interest on rupee borrowings. Therefore, servicing cost of borrowing is more than cost of waiting. It is better to wait, utilize the credit period and make the payment GBP at Forward Ask Rate of ₹ 83.00. Forward Contract Hedge should be preferred.

Summary: Cost in % under different alternatives

Alternatives	Forward Rate	Money Market Hedge	Spot Settlement
Nature of Cost	Annualized Premium	Cost of rupee borrowing, adjusted for inflows from GBP Deposits	Cost of Borrowing in Rupees
Cost in % (if spot settlement)	5.37%	5.91%	12%

Conclusion: Cost of settlement under Forward Rate is the least. Hence, the-Indian Company should prefer the Forward Contract route.

Cash Flow Approach:

Present Value of Cash Flow under Money Market Fledge, Spot Settlement and Forward Market Hedge can be compared.

(i). Forward Rate

Particulars	₹
Amount to be settled (₹) = GBP 50,000 x 3 – Months forward Rate ₹ 83.00	41,50,000
Present Value (based on Cost of Debt) (See Note) = Amount to be settled ÷ (1 + 3 Months)	
Interest Rate for Rupee Borrowing)	40,29,126
$\Rightarrow \text{₹ } 41,50,000 \div (1 + 12\% \times 3 \text{ Months} / 12)$	
$\Rightarrow \text{₹ } 41,50,000 \div (1 + 0.03) = \text{₹ } 41,50,000 \div 1.03$	

Note: Generally, the cash flows are to be discounted at the Cost of Capital. In the absence of Cost of Capital, cash Flow is discounted using Borrowing Rate, as that is the minimum return required to meet the Borrowing cost.

(ii). Money Market Hedge

Facts: The Indian Company will buy GBP 1,00,000 in 3 Months

Inference:

- $\Rightarrow$ GBP 50,000 is a Liability
- $\Rightarrow$ Under Money Market Hedge, asset in GBP should be created
- $\Rightarrow$ The Company should invest in GBP for 3 Months, which along with interest would yield GBP 50,000 in 3 Months
- $\Rightarrow$ It should borrow in ₹ for investing in GBP.



Action	Date	Activity
Borrow	01.04.2007	Borrow in Rupee at 12%, an amount equivalent to GBP, which if invested at 6% p.a., will yield GBP 50,000 in 3 Months. Therefore, GBP required to be invested $\Rightarrow \text{GBP } 50,000 \div (1 + \text{GBP Deposit Interest Rate for 3 Months})$ $\Rightarrow \text{GBP } 50,000 \div (1 + 6\% \text{ p.a.} \times 3 \text{ Months} / 12 \text{ Months})$ $\Rightarrow \text{GBP } 50,000 \div (1 + 1.5\%)$ $\Rightarrow \text{GBP } 50,000 \div 1.015 = \text{GBP } 49,261.0837$ Amount to be borrowed = GBP to be invested X Spot Rate (Ask Rate) = GBP 49,261.0837 x ₹ 81.90 / GBP = ₹ 40,34,483
Convert	01.04.2007	Convert ₹ 40,34,483 into GBP at Spot Rate (Ask Rate since GBP is bought). $\Rightarrow \text{₹ } 40,34,483 \div \text{₹ } 81.90 / \text{GBP} = \text{GBP } 49,261.0837$
Invest	01.04.2007	Invest GBP 49,261.0837 in GBP Deposit for 3 Months at 6% p.a.
Realize	01.07.2007	Realize the maturity value of GBP Deposit along with Interest. Amount receive will be GBP 50,000
Settle	01.07.2007	Settle the GBP 50,000 liability to the Interior Decorafors, using the maturity proceeds of the GBP Deposits.
Repay	01.07.2007	Repay the Rupee Loan. Amount Payable = Amount Borrowed ₹ 40,34,483 x (1 + 12% p.a. for 3 Months) = ₹ 40,34,483 x 1.03 = ₹ 41,55,517

Settle Now

If the Company Settles now, Rupee outflow will be GBP 50,000 X 81.90 = ₹ 40,95,000

Analysis and Conclusion

Alternatives	Forward Rate	Money Market Hedge	Spot Settlement
Present Value of Outflow in Rupees	₹ 40,29,126 (Present Value)	₹ 40,34,483 (Rupee borrowing in the beginning)	₹ 40,95,000

Conclusion: Cash outflow under Forward Rate is the lowest. Therefore, the same should be preferred.

Illustration 15.

Following information relates to Utkal Ltd, which manufactures some parts of an electronics device which are exported to USA, Japan and Europe on 90 days credit terms.

Cost and Sales information —

Particulars	Japan	USA	Europe
Variable Cost per Unit	₹ 225	₹ 395	₹ 510
Export sale price per Unit	Yen 650	US\$10.23	Euro 11.99
Receipts from sale due in 90 Days	Yen 78,00,000	US \$ 1,02,300	Euro 95,920

Foreign exchange rate information

Particulars	Yen/₹	US\$/₹	Euro/₹
Spot Market	2.417-2.437	0.0214-0.0217	0.0177-0.0180
3-Months Forward	2.397-2.427	0.0213 - 0.0216	0.0176 - 0.0178
3 months spot	2.423-2.459	0.02144 - 0.02156	0.0177- 0.0179

Advice Utkal Ltd by calculating average contribution to sales ratio whether it should hedge it's foreign currency risk or not.

Solution:**1. Computation of Exchange Rate (Direct Quotes)**

Particulars	₹ /Yen		₹ /USD		₹ / Euro	
	Bid Rate	Ask Rate	Bid Rate	Ask Rate	Bid Rate	Ask Rate
Spot Market	0.410 (1/2.437)	0.414 (1/2.417)	46.08 (1/0.0217)	46.73 (1/0.0214)	55.56 (1/0.0180)	56.50 (1/0.0177)
3-Months Forward	0.412 (1/2.427)	0.417 (1/2.397)	46.30 (1/0.0216)	46.95 (1/0.0213)	56.18 (1/0.0178)	56.82 (1/0.0176)
3 months spot	0.407 (1/2.459)	0.413 (1/2.423)	46.38 (1/0.02156)	46.64 (1/0.02144)	55.87 (1/0.0179)	56.50 (1/0.0177)
Higher of 3 – Months forward rate and Spot rate [Bid]	0.412 [Forward]		46.38 [Spot]		56.18 [Forward]	

Bid rate is relevant since the export will be selling Foreign Currency and buying Indian Rupees.

2. Computation of Contribution per Unit in Foreign Currency [Based on 3-Months Rate]**[3-Months Forward vs. 3-Months' Spot]**

Particulars	Japan		USA		Europe	
	Spot	Forward	Spot	Forward	Spot	Forward
(a) Variable Cost per Unit	₹ 225.00	₹ 225.00	₹ 395.00	₹ 395.00	₹ 510.00	₹ 510.00
(b) Export sale price per Unit [Foreign Currency]	Yen 650	Yen 650	USD 10.23	USD 10.23	Euro 11.99	Euro 11.99
(a) Relevant Bid Rate	₹ 0.407	₹ 0.412	₹ 46.38	₹ 46.30	₹ 55.87	₹ 56.18
(b) Export Sale Proceeds p.u. [b] x (c)]	₹ 264.55	₹ 267.80	₹ 474.47	₹ 473.65	₹ 669.88	₹ 673.60
(c) Contribution per Unit [(d) - (a)]	₹ 39.55	₹ 42.80	₹ 79.47	₹ 78.65	₹ 159.88	₹ 163.60
(d) Contribution Ratio [(e) ÷ (d)]	15.0%	16.0%	16.7%	16.6%	23.9%	24.3%
(e) Advice	Hedge using Forward Market Cover		Do Not Hedge		Hedge using Forward Market Cover.	

Recommendation: The Company should hedge is foreign currency risk / exposure in Japanese Yen and Euro, since by hedging, the Company stands to gain a higher Contribution to Sales Ratio and therefore, higher profit margin. However, for sale to USA, the Company need not hedge its exposure in Dollars, since movement in Spot Market is more beneficial than hedging through Forward Market Cover.

Illustration 16.

Good Morning Ltd., London will have to make a payment of \$ 3,64,897 in six month's time. It is currently 1st October. The company is considering the various choices it has in order to hedge its transaction exposure.

Exchange rates:

Spot rate	\$1.5617 – 1.5773
Six month forward rate	\$1.5455 – 1.5609

	Borrow(%)	Deposit(%)
US	6	4.5
UK	7	5.5

**Foreign currency option prices (1 unit is £ 12,500):**

Exercise Price	Call option (March)	Put option (March)
\$1.70	\$ 0.037	\$ 0.096

By making the appropriate calculations and ignoring time value of money (in case of Premia) decide which of the following hedging

- (a) Forward market;
- (b) Cash (Money) market;
- (c) Currency options.

Solution:

Relevant Rule for Conversion: Based on nature of Quote (Direct or indirect)

Nature of Quote	Buying-Foreign Currency (Converting - Home Currency into Foreign Currency)	Selling Foreign Currency (Converting Foreign Currency into Home Currency)
Direct Quote, relevant rate is	Ask Rate	Bid Rate
Indirect Quote, relevant rate is	$1 \div \text{Bid Rate}$	$1 \div \text{Ask Rate}$

(a) Forward Market:

Particulars	Computation	Amount (\$)
Amount Payable	Given	\$ 3,64,897
Amount under Forward Contract	$\$ 3,64,897 \div 1.5455$ (Forward Bid Rate)	£2,36,103

(b) Cash Money Market

1. **Requisite:** Money Market Hedge is possible only in case of difference in rates of interest for borrowing and investing.

2. **Activity Flow:**

Borrow: Borrow Sterling equivalent of money at 7% p.a. for 6 Months for investing. **Convert:** Convert the money borrowed in Sterling to US \$ at Spot Rate (**Bid**)

Invest: Invest US \$ so converted in Dollar Deposits at 4.5% p.a. for 6 Months

Realize: Realize the Deposit including Interest and use the proceeds to settle the liability.

3. **Cash Flow:**

Particulars	Amount
Amount Payable After 6 Months	US \$ 3,64,897
Amount to be Invested at 4.5% p.a. for realizing US \$ 3,64,897 = US \$ 3,64,897 $\div (1 + \text{Interest Rate of } 4.5\% \text{ p.a.} \times 6/12) = \$ 3,64,897 \div 1.0225$	US \$ 3,56,867
Amount be borrowed Amount to be invested in US \$ 3,64,897 $\div$ 1.5617 (Spot Bid Rate)	£2,28,512
Interest payable On money borrowed @ 7% p.a. for 6 Months $= ₹ 2,28,512 \times 7\% \times 6 \text{ Months} / 12 \text{ Months}$	£ 7,998
Total Amount Payable Amount Borrowed £ 2,28,512+ Interest £ 7,998	£2,36,510

(c) Currency Options

Payment is to be made in Pounds after 6 months, hence Put option to sell Pounds is relevant.

Number of Options Contract

- Value of one Options Contract = Value per unit X Exercise price = £ 12,500 x 1.70 = £21,250
- Number of Contracts to be purchased = Amount payable in 6 month's time ÷ Value per contract
= 3,64,897 ÷ 21,250 = 17.17 Contracts

Alternative 1: 17 Options Contracts are undertaken and the balance through Forward Contract.

- Value covered under Options = 17 Contracts X \$ 21,250 per Contract = \$ 3,61,250
- Value under Forward Contract = Amount payable after 6 months - Value under Options
= \$ 3,64,897 - \$ 3,61,250 = \$3,647

Cash Flows under Options

Particulars	Amount
Value of Forward Contract in £ = (\$ 3,64,897 - \$) ÷ 1.5455)	£ 2360
Premium Payable [\$0.096 X 17 x 12,500 = \$ 20,400 = \$ 20,400 ÷ 1.5617 (Spot Bid Rate)]	£ 13,063
Value of the 17 Options Contract [17 x 12,500]	£2,12,500
Total Outflow under Options	£ 2,27,923

Alternative 2: 18 Option Contracts are undertaken and the excess Dollars are sold in the Forward Market

- Value covered under Options = 18 Contracts X \$ 21,250 per Contract = \$ 3,82,500
- Value sold under Forward Contract = Amount payable after 6 months - Value under Options
= \$3,64,897 - \$ 3,82,500 = **\$17,603**

Cash Flows under Options

Particulars	Amount
Value of Forward Contract in £ = (\$ 17,063 ÷ 1.5609)	£ 11,277
Premium Payable [\$0.096 X 18 x 12,500 = \$ 21,600 = \$21,400 ÷ 1.5617 (Spot Bid Rate)]	\$21,600
Value of the 18 Options Contract [18 x 12,500]	£ 2,25,000
Total Outflow under Options	£ 2,27,554

Conclusion: The Cash outflow under Options is the lowest and hence it may be undertaken.

Illustration 17.

Your Company has to make a US \$ 1 Million payment in three month's time. The dollars are available now. You decide to invest them for three months and you are given the following information.

- The US deposit rate is 8% p.a.
 - The sterling deposit rate is 10% p.a.
 - The spot exchange rate is \$ 1.80 / pound.
 - The three month forward rate is \$ 1.78/ pound.
- Where should your company invest for better results?
 - Assuming that the interest rates and the spot exchange rate remain as above, what forward rate would yield an equilibrium situation?
 - Assuming that the US interest rate and the spot and forward rates remain as in the original question, where would you invest if the sterling deposit rate were 14% per annum?



- With the originally stated spot and forward rates and the same dollar deposit rate, what is the equilibrium sterling deposit rate?

Solution:

(i) Invest for better results

Since the US \$ are available now, amount can be invested in

- US \$ Deposits @ 8% p.a. or
- Converted into Sterling Currency at the Spot Rate and invested in UK Deposits.

Alternative 1

Particulars	Value
Invest in \$ deposits @	8% p.a. for 3 months.
Income = \$ 10,00,000 x 8/100x3/12	\$ 20,000

Particulars	Value
1. Convert Dollars into Pounds at Spot Rate (US \$ 10,00,000 ÷ 1.80)	£5,55,556
2. Invest £5,55,556 in Sterling Deposits at the rate of 10% p.a. for 3 months interest on £5,55,556 @ 10% for 3 months = £5,55,556 10% × 3/12	£13,889
3. Total Cash Inflow at the end of 3 months [(2)+(3)]	£5,69,445
4. Amount earned in US \$ = [(4) × 1.78 (Forward Rate)]	US \$ 10,13,612
5. Gain in US \$ [10,13,612 – 10,00,000]	US \$13,612

Gain in **Alternative 1** is higher. Hence, company should invest in US Deposits.

(ii) Equilibrium Forward Rate 3 Months Forward; (for 1 £)

= Spot Rate X [(1 + US Interest Rate for 3 Months) / (1 + Sterling Interest Rate for 3 Months)]

= \$ 1.8 X [(1 + 8%/4) / (1 + 10%/4)] = **\$1.7912/ £ [Interest Rate Parity Method]**

Equilibrium 3 months Forward Rate = \$ 1.7912 / £

(iii) Investment if Sterling Deposit: Rate is 14%

Particulars	Amount
1. Amount invested in Sterling Deposit Rate	£ 5,55,556
2. Interest Income @ 14% for 3 months £ 5,55,556 x 14 % x 3 / 12	£ 19,444
3. Total Cash Inflow at the end of 3 months [(2) + (3)]	£ 5,75,000
4. Amount earned in US \$ = [(4) x 1.78 (Forward Rate)]	US \$ 10,23,500
5. Gain in US \$ [10,23,500 - 10,00,000]	US \$ 23,500

Conclusion: Gain is highest of all the considered alternatives, therefore amount should be invested in Sterling Deposits @ 14%.

(iv) Equilibrium Sterling Deposit Rate Franc Interest Rate [6 Months] = Assuming Sterling Interest Rate = x, applying the same in Interest Rate Parity Formula for determining Forward Rate —

$$£ 1 = \text{Spot Rate} \times \frac{(1 + \text{US Rate for 3 Months})}{(1 + \text{Sterling Interest Rate for 3 Months})}$$

$$1 £ = \$1.80 \times (1 + 8\%/4) / (1 + x/4)$$

$$1 \text{ £} = \$1.80 \times (1 + 0.02) / (1 + x/4);$$

$$\Rightarrow \$1.78 = \$1.80 \times (1 + 0.02) / (1 + x/4);$$

$$\Rightarrow 1 + x/4 = \$1.80 \times 1.02 / \$1.78$$

$$\Rightarrow x/4 = 1.03146 - 1 = 0.03146 \text{ or } 3.146\%$$

$$\Rightarrow x = \mathbf{12.58\%}$$

Equilibrium Sterling Interest Rate = 12.58%

Illustration 18.

DS Inc. is considering a new plan in Netherlands. The plan will cost 26 Million Guilders. Incremental Cash Flows are expected to be 3 Million Guilders per year for the first 3 years, 4 Million Guilders for the next 3, 5 Million Guilders in Years 7 to 9, and 6 Million Guilders in years 10 through 19, after which the project will terminate with no residual value.

The present exchange rate is 1.90 Guilders per dollar. The required rate of return on repatriated dollar is 16%.

- (a) If the exchange rate states at 1.90, what is the project NPV?
 (b) If the guider appreciates to 1.84 for years 1 - 3, to 1.78 for years 4-6, 1.72 for years 7-9, and to 1.65 for years 10-19, what happens to the NPV?

Solution:

1. Net Present Value under Fixed Exchange Rate (\$ 1 = Guilders 1.90)

Particulars	Years				
	0	1- 3	4 - 6	7 - 9	10 - 19
(a) Cash Flows in Guilders	(26.00)	3.00 p.a.	4.00 p.a.	5.00 p.a.	6.00 p.a.
(b) Exchange Rate [Guilders / \$]	1.90	1.90	1.90	1.90	1.90
(c) Cash Flow in \$	(13.6842) [26.00/1.90]	1.5789 [3.00/1.90]	2.1053 [4.00/1.90]	2.6312 [5.00/1.90]	3.1579 [6.00/1.90]
(d) Discount Factor @ 16%	1	2.246	1.439	0.922	1.270
(e) Discounted Cash Flow	(13.6842)	3.5462	3.030	2.4260	4.0105

Net Present Value = **US \$ (0.6714) Million**

Recommendation: Since the Net Present Value is negative, the project should not be accepted.

2. Net Present Value under Variable Exchange Rates

Particulars	Years				
	0	1-3	4-6	7-9	10-19
Cash Flows in Guilders	(26.00)	3.00 p.a.	4.00 p.a.	5.00 p.a.	6.00 p.a.
Exchange Rate [Guilders / \$]	1.90	1.84	1.78	1.72	1.65
Cash Flow in \$	(13.6842) [26.00/1.90]	1.6304 [3.00/1.84]	2.2472 [4.00/1.78]	2.9070 [5.00/1.72]	3.6364 [6.00/1.65]
Discount Factor @ 16%	1	2.246	1.439	0.922	1.270
Discounted Cash Flow	(13.6842)	3.6619	3.2337	2.6803	4.6182

Net Present Value = **US \$ 0.5099 Million**

Recommendation: Since the Net Present Value is positive, the project **may be** accepted.



Illustration 19.

A USA based company is planning to set up a software development unit in India. Software development at the Indian unit will be bought back by the US parent at a transfer price of US \$ 10 million. The unit will remain in existence in India for one year; the software is expected to get developed within this time frame.

The US based company will be subject to corporate tax of 30 per cent and a with -holding tax of 10% in India and will not be eligible for tax credit in the US.

The software developed will be sold in the US market for US \$ 12.0 million. Other estimates are as follows

Rent for fully furnished unit with necessary hard ware in India	₹ 15,00,000
Man power cost (80 software professional will be working for 10 hours each day)	₹ 400 per man hour
Administrative and other costs	₹ 12,00,000

Advise the US company on financial viability of the project. The rupee-dollar rate is ₹ 48/\$.

Solution:

1. Cost of Operating the Indian Unit for 1 Year

Particulars	Value
Rental Cost [assumed to be annual]	₹ 15.00 Lakhs
Man Power Cost [80 Professionals X 365 Days x 10 Hours per Day x ₹ 400 per Hour]	₹ 1,168.00 Lakhs
Administrative and Other Costs [assumed to be annual]	₹ 12.00 Lakhs
Total Annual Cost of Operation	₹ 1,195.00 Lakhs
Exchange Rate per USD	₹ 48.00
Total Annual Cost of Operation in USD [₹ 1195 Lakhs ÷ ₹ 48.00]	USD 24.90 Lakhs

2.. Computation of Indian Withholding Tax

Particulars	Value
Transfer Price for the Software	USD 100.00 Lakhs
Withholding Tax Rate in India	10%
Tax withheld in India [USD 100.00 Lakhs x 10%]	USD 10.00 Lakhs

3. Computation of Gain to Indian Business Unit

Particulars	Value
Transfer Price for the Software	USD 100.00 Lakhs
Cost of Operation for One Year	USD 24.90 Lakhs
Gain of Indian Business Unit [Transferred to US Parent]	USD 75.10 Lakhs

4. Computation of Tax Liability for US Parent Company (in US)

Particulars	Value
Sale Price of the Software in US Market	USD 120.00 Lakhs
Less: Price at which transferred from India to US	USD 100.00 Lakhs
Profit on Sale (taxable at 30% in the US Market)	USD 20.00 Lakhs
Add: Share of Gain of Indian Business Unit	USD 75.10 Lakhs
Total Taxable Income of the US Parent Company	USD 95.10 Lakhs
Tax Liability at 30%	USD 28.53 Lakhs

5. Cost Benefit Analysis

Particulars	Value
Inflow on Sale of Software in US Market [A]	USD 120.00 Lakhs
Summary of Outflows:	
Annual Operation Cost of Indian Software Development Unit Tax Withheld in India for which credit is not available	USD 24.90 Lakhs
Tax Liability in US for Total Profits of the US Company	USD 10.00 Lakhs
Total Cash Outflow to the Company [B]	USD 28.53 Lakhs
Net Benefit / Cash Inflow [A-B]	USD 63.43 Lakhs
	USD 56.57 Lakhs

Recommendation: The project yields a net surplus of USD 56.57 Lakhs or USD 5.657 Millions (approximately). Therefore, the project is financially viable and the US Company may go ahead with the project.

Illustration 20.

Unitech DLS's, international transfer of funds amounts to US \$20 Lakhs monthly. Presently the average transfer time is 10 days. It has been proposed that the transfer of funds be turned over to one of the larger international banks, which can reduce the transfer time to an average of two days. A charge of 0.5% of the volume of transfer has been proposed for this service. In view of the fact that the firm's opportunity cost of funds is 12%, should this offer be accepted?

Solution:

1. Effective Yield on Saving

Period Saved = 10 Days Less 2 Days	8 Days
Cost of Funds	12%p.a.
Percentage Yield for the period saved $(8/365 \times 12\% \text{p.a.})$	0.263%

2. Evaluation

- The cost of international transfer of 0.5% is more than the amount of interest saved at 0.263% i.e. more by around 0.237%. Therefore, prima facie the Company should not opt for the proposal of transferring through International Bank.
- However, saving in time also reduces the exposure of funds to various foreign exchange risks. The Company has to consider the effect of such exposure and decide on the proposal of the International Bank. If expected cost of such exposure is more than 0.237%, then the Company should go for transfer through International Banks.

Illustration 21

ABC Ltd is considering a project in US, which will involve an initial investment of US \$1,10,00,000. The project will have 5 years of life. Current spot exchange rate is ₹ 48 per US \$. The risk free rate in US is 8% and the same in India is 12%. Cash inflows from the project are as follows —

Years	1	2	3	4	5
Cash Inflow (US \$)	20,00,000	25,00,000	30,00,000	40,00,000	50,00,000

Calculate the NPV of the project using foreign currency approach. Required rate of return on this project is-14%.

Solution:

1. Computation of Discount Rate

Note: It is assumed that the required rate of return of 14% (Risk Adjusted Rate) is for rupee inflows.

$$1 + \text{Risk Adjusted Rate} = (1 + \text{Risk Free Rate}) \times (1 + \text{Risk Premium for the project})$$

$$\Rightarrow 1 + 14\% = (1 + 12\%) \times (1 + \text{Risk Premium})$$

$$\Rightarrow 1.14 = 1.12 \times (1 + \text{Risk Premium})$$

$$\Rightarrow 1 + \text{Risk Premium} = 1.14 \div 1.12 = 1.01786$$

$$\Rightarrow \text{Risk Premium} = 0.01786 \text{ or } 1.786\%$$



Therefore, Risk Adjusted Discount Rate for Dollar Flows is

$$\begin{aligned}
 (1 + \text{Risk Adjusted Discount Rate}) &= (1 + \text{USD Risk Free Rate}) \times (1 + \text{Project Risk Premium}) \\
 &= (1 + 8\%) \times (1 + 1.786\%) \\
 &= 1.08 \times 1.01786 = 1.09929
 \end{aligned}$$

⇒ Risk Adjusted Discount Rate = $1.09929 - 1 = 0.09929$ or **9.93%**

2. Computation of Net Present Value

[USD in Lakhs]

Particulars	Year	PV Factor @9.93%	Cash Flow	Disc. Cash Flow
Annual Cash Inflow	1	$1 \div 1.0993 = 0.910$	20.00	18.20
	2	$1 \div 1.0993^2 = 0.827$	25.00	20.68
	3	$1 \div 1.0993^3 = 0.753$	30.00	22.59
	4	$1 \div 1.0993^4 = 0.685$	40.00	27.40
	5	$1 \div 1.0993^5 = 0.623$	50.00	31.15
Present Value of Cash Inflows				120.02
Less: Initial Investment				(110.00)
Net Present Value (in USD Lakhs)				10.02
NPV in ₹ Lakhs [USD 10.02 x Spot Rate 48.00 per USD]				480.96

Illustration 22.

Following are the details of cash and outflows in foreign currency denominations of M Co., an Indian export firm, which have no foreign subsidiaries —

Currency	Inflow	Outflow	Spot rate	Forward rate
US \$	4,00,00,000	2,00,00,000	48.01	48.82
French Franc (F Fr)	2,00,00,000	80,00,000	7.45	8.12
UK £	3,00,00,000	2,00,00,000	75.57	75.98
Japanese Yen	1,50,00,000	2,50,00,000	3.20	2.40

(a) Determine the net exposure of each foreign currency in terms of Rupees.

(b) Are any of the exposure positions off-setting to some extent?

Solution:

1. Computation of Net Exposure

Particulars	US \$	F Fr	UK £	Japan Yen
Inflow (in Lakhs)	400.00	200.00	300.00	150.00
Less: Outflow	(200.00)	(80.00)	(200.00)	(250.00)
Net Exposure (Foreign Currency Terms)	200.00	120.00	100.00	(100.00)
Spot Exchange Rate	48.01	7.45	75.57	3.20
Net Exposure (in Rupee Terms based on Spot Exchange Rate)	9602	894	7557	(32)
	[200x48.01]	[120 x 7.45]	[100 x 75.57]	[100 x 3.20/10]

Particulars	US \$	F Fr	UK£	Japan Yen
Forward Rate [₹ , FC]	48.82	8.12	75.98	2.40
Less: Spot Exchange Rate [₹ / FC]	48.01	7.45	75.57	3.20
Forward Premium/ (Discount)	0.81	0.67	0.41	(0.80)
Net Exposure in Rupee Terms based on extent of uncertainty represented by Premium / (Discount)	162.0	80.4	41.0	8.0
	[200 x 0.81]	[120 x 0.67]	[100 x 0.41]	[(100) x (0.8)/ 10]

2. Off Setting Position:

- (a) Net Exposure in all the currencies are offset by better forward rates. In the case of USD, F Fr and UK Pound, the net exposure is receivable, and the forward rates are quoted at a premium for these currencies.
- (b) In case of Japanese Yen, the net exposure is payable, and the forward rate is quoted at a discount. Therefore, a better forward rate is also offsetting the net payable in Japanese Yen.

Illustration 23.

An American Small Car Manufacturing Company wants to establish a project in China, after surveying the country for demand for small cars. Initial outlay is USD 120 Millions. Annual Cash Flows (in Chinese Yuan) for the next 5 Years are — 200 Millions, 350 Millions, 300 Millions, 250 Millions, 150 Millions. At the end of five years, the Project would be wound up.

Considering China's stringent exchange restrictions, and its average cost of capital, the desired return is 15% in USD terms.

In respect of project investment by Foreign Companies, the Chinese laws restrict repatriation to 10% of the Project Investment for each of the first 3 Years. The Foreign Company's share in the cash flows in excess of 10% of the Project Investment should be invested in 6% Tax Free Government of China Bonds. The Bonds will mature at the end of the 3rd Year.

The spot rate is USD 0.1250 per Yuan. The Yuan is expected to appreciate by 10% every year for the next 2 Years, and depreciate 3% every year, thereafter.

Evaluate the project from the American Company's perspective. Would there be any change, if the 50% of the project is financed by a Chinese Engineering Firm?

Solution:**1. Exchange Rates for the next 5 Years**

Year	Spot Rate (Beginning)	Appreciation / Depreciation Rate	Closing Spot Rate (USD/Yuan)
1	0.1250	10%	$0.1250 \times 1.10 = \text{USD } 0.1375$
2	0.1375	10%	$0.1375 \times 1.10 = \text{USD } 0.1513$
3	0.1513	(3%)	$0.1513 \times 0.97 = \text{USD } 0.1468$
4	0.1468	(3%)	$0.1468 \times 0.97 = \text{USD } 0.1424$
5	0.1424	(3%)	$0.1424 \times 0.97 = \text{USD } 0.1381$

2. Amount Repatriated in the next 5 Years (in Yuan/ USD Millions) [Without JV Partner]

Project Investment in Yuan $\text{USD } 120 \text{ Million} \div \text{Spot Rate } \text{USD } 0.1250 \text{ Yuan} = \text{Yuan } 960.00 \text{ Millions}$

Years		1	2	3	4	5
Net Cash Flow (Yen)	A	200.00	350.00	300.00	250.000	150.000
Maximum Amount Repatriable (10% of Project Cost)	B	96.000	96.000	96.000	No Restriction	No Restriction
Amount Repatriated (Lower A and B)	C	96.000	96.000	96.000	250.00	150.000
Amount to be invested in Govt. of China Bonds (A - C)	D	104.00	254.000	204.000	-	-
Proceeds on Maturity of Govt. Bonds (See Note) (Yuan)	E	-	-	590.094	-	-
Net Inflow (Yuan) [C + E]		96.000	96.000	680.094	250.000	150.000

Note: Inflow from proceeds on Maturity of Government of China Bonds



Year	Opening Investment	Additional Investment	Interest for the Year @ 6% p.a. on Opening Balance	Closing Investment
1	NIL	104.000	—	104.000
2	104.000	254.000	6.240	364.240
3	364.240	204.000	21.854	590.094

3. Amount Repatriated in the next 5 Years (in Yuan / USD Millions) [With a JV Partner]

Project Investment in Yuan USD 120 Millions ÷ Spot Rate USD 0.1250/Yuan = Yuans 960.00 Millions

Years		1	2	3	4	5
Net Cash Flow (Yen)	A	200.000	350.000	300.000	250.000	150.000
Cash Flow Attributable to American Company [50% of A]	B	100.000	175.000	150.000	125.000	75.000
Maximum Amount Repatriable (10% of Project Cost)	C	96.000	96.000	96.000	No Restriction	No Restriction
Amount Repatriated (Lower B and C)	D	96.000	96.000	96.000	125.000	75.000
Amount to be invested in Govt. of China Bonds (B - C)	E	4.000	79.000	54.000	-	-
Proceeds on Maturity of Govt. Bonds (See Note) (Yuan)	F	-	-	142.234	-	-
Net Inflow (Yuan) [D + F]		96.000	96.000	236.234	125.000	75.000

Note: Inflow from Proceeds on Maturity of Government of China Bonds

Year	Opening Investment	Additional Investment	Interest for the Year @ 6% p.a. on Opening Balance	Closing Investment
1	NIL	4.000	—	4.000
2	4.000	79.000	0.240	83.240
3	83.240	54.000	4.994	142.234

4. Evaluation of the Project

Year	Conversion rate	Discount Rate @ 15%	Without JV Partner			With JV partner		
			Cash Flow yuan	Cash Flow USD	Cash Flow USD Discount	Cash Flow Yuan	Cash Flows USD	Cash Flow USD Discount
1	2	3	4	5 = 4 x 2	6 = 3 x 5	7	8 = 7 x 2	9 = 8 x 3
0	0.1250	1	(960.000)	(120.000)	(120.0000)	(480.000)	(60.000)	(60.0000)
1	0.1375	0.8696	96.000	13.200	11.4787	96.000	13.200	11.4787
2	0.1513	0.7561	96.000	14.525	10.9824	96.000	14.525	10.9824
3	0.1468	0.6575	680.094	99.838	65.6434	236.234	34.679	22.8014
4	0.1424	0.5718	250.000	35.600	20.3561	125.000	17.800	10.1780
5	0.1381	0.4972	150.000	20.715	10.2995	75.000	10.358	5.1500
Net Present Value					(1.2399)			0.5905

Conclusion: The project has a positive NPV only when the American Company establishes the Unit with a Chinese JV Partner.

Illustration 24

Das Ltd. an Indian company is evaluating an investment in Hong Kong. The project costs 300 Million Hong Kong Dollars. It is expected to generate an income of 100 Million HKDs a year in real terms for the next 4 years (project duration). Expected inflation rate in Hong Kong is 6% p.a. Interest rate in India is 7% p.a. while in Hong Kong it is 10% p.a.

The risk premium for the project is 6% in absolute terms, over the risk free rate. The project beta is 1.25. Spot Rate per HKD is ₹ 5.75.

Evaluate the project in Rupees, if the investment in the project is out of retained earnings.

Solution:**1. Inflation Adjusted Cash Flows (in HKD Millions)**

Year	Real Cash Flow	Inflation Factor	Adjusted Cash Flows
1	100	1.0600	106.00
2	100	$1.0600 \times 1.06 = 1.1236$	112.36
3	100	$1.1236 \times 1.06 = 1.1910$	119.10
4	100	$1.1910 \times 1.06 = 1.2625$	126.25

2. Expected Future Spot Rates (under Interest Rate Parity Theory)

$$\text{Future Spot Rate} = \text{Opening Spot Rate} \times \frac{(1 + \text{Home Currency Rate i.e. India Rate})}{(1 + \text{Foreign Currency Rate i.e. HKD Rate})}$$

Year	Opening Spot Rate (₹ / HKD)	Closing Spot Rate
1	5.750	$\text{₹ } 5.750 \times (1 + 0.07) / (1 + 0.10) = \text{₹ } 5.593$
2	5.593	$\text{₹ } 5.593 \times (1 + 0.07) / (1 + 0.10) = \text{₹ } 5.441$
3	5.441	$\text{₹ } 5.441 \times (1 + 0.07) / (1 + 0.10) = \text{₹ } 5.292$
4	5.292	$\text{₹ } 5.292 \times (1 + 0.07) / (1 + 0.10) = \text{₹ } 5.148$

3. Evaluation of Project (₹ Millions)

Year	Cash Flow (HKD)	Conversion Rate	Cash Flow (₹)	PV Factor @ 14.50%	Discounted Cash Flow (₹)
0	(300.00)	₹ 5.750	(1725.000)	1.000	(1725.000)
1	106.00	₹ 5.593	592.858	0.873	517.565
2	112.36	₹ 5.441	611.351	0.763	466.461
3	119.10	₹ 5.292	630.277	0.666	419.764
4	126.25	₹ 5.148	649.935	0.582	378.262
Net Present Value					57.052

Note: Discount Rate = Risk Free Rate + Project Beta x Risk Premium

$$7\% - 1.25 \times 6\% = 7\% + 7.5\% = 14.50\%$$

Conclusion: Since the NPV is positive, investment in Hone Kong can be proceeded with.

Illustration 25

Chandan Pharma Ltd, an American Company, is evaluating an overseas investment in an East Asian Country, where the currency EA. The initial investment for the project is EA 250 Millions. The project cash flows are as follows -

Years	1	2	3	4
Cash Flows (EA Millions)	75	95	125	135



The following additional information is available —

1. Inflation Rate in the East Asian Country is 4%.
2. Risk free interest rate in US is 10% whereas, in East Asian country is 8%. Both US and East Asian Country have identical real rate of interest. No change in real rate of interest expected during the life of the project.
3. Current spot rate is USD 1 = EA 4
4. The desired return on the project is 16% in USD terms.

Calculate NPV by discounting annual cash flows in — (a) US Dollars; and (b) EA

Solution:

1. Calculation of Future Spot Rates (Interest Rate Parity Theory)

$$\text{Future Spot Rate} = \text{Opening Spot Rate} \times \frac{(1 + \text{Home Currency Interest i.e. EA})}{(1 + \text{Foreign Currency Interest Rate i.e. USD})}$$

Year	Opening Spot Rate(EA/ USD)	Closing Spot Rate
1	EA 4.0000	EA 4.0000 X (1 + 0.08)/(1 + 0.10) = EA 3.9273
2	EA 3.9273	EA 3.9273 X (1 + 0.08)/(1 + 0.10) = EA 3.8559
3	EA 3.8559	EA 3.8559 X (1 + 0.08)/(1 + 0.10) = EA 3.7858
4	EA 3.7858	EA 3.7858 X (1 + 0.08)/(1 + 0.10) = EA 3.7169

2. Computation of Discount Rate for EA Cash Flows

Process: ⇒ Ascertaining inflation rate for USD (under Purchasing Power Parity Theory)

⇒ Ascertaining real return required for the project (i.e. eliminating the effect of inflation on USD Rate of Return of 16%)

⇒ Applying EA inflation rate of 4% on real rate of return to ascertain Discount Rate for Cash Flows

Reason: Since real rate is same in both the countries, the discount rate should adjusted only for inflation difference.

Particulars	Computation
Inflation Rate for US	$\text{Future Spot Rate} = \frac{\text{Spot Rate} \times (1 + \text{Home Currency Inflation Rate})}{(1 + \text{Foreign Currency Inflation Rate})}$ $\Rightarrow \text{EA 3.9273} = \text{EA 4.00} \times (1 + 4\%) / (1 + \text{USD Inflation Rate})$ $= \text{EA 4.00} \times 1.04 \div (1 + \text{USD Inflation Rate})$ $\Rightarrow (1 + \text{USD Inflation Rate}) = \text{EA 4.00} \times 1.04 \div \text{EA 3.9273} = 1.0593$ $\Rightarrow \text{USD Inflation Rate} = 1.0593 - 1 = 0.0593 \text{ or } 5.93\%$
Real rate return for Project	$(1 + \text{Discount Rate}) = (1 + \text{Real Rate}) \times (1 + \text{Inflation Rate})$ $\Rightarrow (1 + 16.00\%) = (1 + \text{Real Rate}) \times (1 + 5.93\%)$ $\Rightarrow (1 + \text{Real Rate}) = 1.16 \div 1.0593 = 1.0951$ $\Rightarrow \text{Real Rate} = 1.0951 - 1 = 0.0951 \text{ or } 9.51\%$
Discount Rate for EA Cash Flows	$(1 + \text{Discount Rate}) = (1 + \text{Real Rate}) \times (1 + \text{Inflation Rate})$ $\Rightarrow (1 + \text{Discount Rate}) = (1 + 9.51\%) \times (1 + 4\%)$ $\Rightarrow (1 + \text{Discount Rate}) = 1.0951 \times 1.04 = 1.1389$ $\Rightarrow \text{Discount Rate} = 1.1389 - 1 = 0.1389 \text{ or } 13.89\%$

Alternatively, extending the Interest Rate Parity Theory to difference in Discount Rates (since the real rate of interest is same in both the countries)

$$\begin{aligned}\text{Future Spot Rate} &= \text{Spot Rate} \times \frac{(1 + \text{Home Currency Discount Rate})}{(1 + \text{Foreign Currency Discount Rate})} \\ \Rightarrow \text{EA } 3.9273 &= \text{EA } 4.00 \times (1 + \text{EA Discount Rate}) \div (1 + 16\%) \\ \Rightarrow 1 + \text{EA Discount Rate} &= \text{EA } 3.9273 \times 1.16 \div \text{EA } 4.00 = 1.1389 \\ \Rightarrow \text{EA Discount Rate} &= 1.1389 - 1 = 0.1389 \text{ or } 13.89\%\end{aligned}$$

3. Computation of NPV by discounting EA Cash Flows

(assuming that cash flows are in money terms i.e. adjusted for inflation)

Year	Cash Flow EA	PV Factor @ 13.89%	Discounted Cash Flow (EA)
0	(250.00)	1.0000	(250.0000)
1	75.00	0.8780	65.8500
2	95.00	0.7710	73.2450
3	125.00	0.6769	84.6125
4	135.00	0.5944	80.2440
Net Present Value			53.9515

Net Present Value in USD Terms = EA 53.9515 ÷ EA 4/ USD = USD 13.4879

4. Computation of NPV by discounting USD Cash Flows

Year	Cash Flow (EA)	Conversion (Rate)	Cash Flow (₹)	PV Factor @ 16.00%	Discounted Cash Flow (₹)
0	(250.00)	EA 4.0000	(62.5000)	1.000	(62.5000)
1	75.00	EA 3.9273	19.0971	0.8621	16.4636
2	95.00	EA 3.8559	24.6376	0.7432	18.3107
3	125.00	EA 3.7858	33.0181	0.6407	21.1547
4	135.00	EA 3.7169	36.3206	0.5523	20.0599
Net Present Value					13.4889

Illustration 26

Tinsel Inc. USA currently exports 500 calculators per month to UAE @ \$60 per piece. The variable cost per calculator is \$40. In December 2000, the company was approached by the Government of UAE to establish a manufacturing plant in UAE.

After a careful analysis, the company decided to make an equity investment of \$ 1 million, half of which would represent working 'capital and the other half the fixed assets. The company would sell the plant to a local entrepreneur for a sum of \$ 1 million at the end of 5 years and the Central Bank of UAE would repay the company \$ 5.00.000 for working capital.

In return for an increase in tariffs against other companies, Tinsel Inc. Will sell its calculators at \$ 50 per unit in the UAE. In addition, the company undertakes to buy certain raw materials from local suppliers and also to employ local managers. The total cost of local managers and materials would be \$ 15 per calculator. Other materials would be purchased from the parent company at \$ 10 and the parent company would receive a direct contribution to overhead variable costs at \$ 5 per unit sold.

Under this arrangement, the company expects to sell 1000 calculators per month. The fixed assets are to be depreciated on a straight line basis over a five year period. The company will have to pay income - tax at 50 percent on profits earned in Bahrain. The United States also has 50 percent tax rate



with direct credit for UAE taxes.

The current exchange rate is ten UAE dinars per dollar and is expected to stay the same for the next five years. There is no restriction on cash flow repatriation.

(a) Determine the adjusted present value of the project at 10 percent.

(a) Tinsel Inc. has been informed that if it decides to reject the project, it would lose its entire export sales to the UAE. How does this affect the decision of Tinsel Inc.?

Solution:

(a) Adjusted Present Value of the Project at 10%

1. Cash flow for the project lifespan of 5 years is as follows –

Particulars	Amount (\$)
Sales Revenue (50 x 12 x 1,000)	6,00,000
Less: Variable cost [(15 + 10 - 5) x 1000 x 12]	(2,40,000)
Less: Depreciation	(1,00,000)
Profit before tax [PBT]	2,60,000
Less: Taxes (50%)	(1,30,000)
Profit after tax [PAT]	1,30,000
Add: Depreciation	1,00,000
Cash Flow After Taxes	2,30,000

2. Cash Flow during year 5

Particulars	Amount (\$)
Sale Value	10,00,000
Less: Written Down Value [WDV]	Nil
Profit on Sale-	10,00,000
Less: Tax on Sale @ 50%	(5,00,000)
After Tax Profit on Sale	5,00,000
Add: Repayment of Working Capital	5,00,000
Add: CFAT[1]	2,30,000
Total Cash Flow in Year 5	12,30,000

3. Calculation of Adjusted Present Value at 10%.

Year	CFAT	Disc factor @ 10%	DCFAT
1 -4	2,30,000	3.1699	7,29,077
5	12,30,000	0.6209	7,63,707
Discounted Cash Inflows			14,92,784
Less: Initial Investment			(10,00,000)
Net Present Value			4,92,784

(b) Cost - Benefit Analysis for Tinsel Inc. to accept or reject the project.**Case I: Rejection of Project**

If Tinsel Inc. rejects the project, it will lose its entire export sales to the UAE.

Particulars	Amount (\$)
Sales revenue [60 x 500 x12]	3,60,000
Less: Variable cost [40 x 500 x12]	2,40,000
Profit before Tax (PBT)	1,20,000
Less: Taxes at 50%	60,000
Profit After Tax	60,000
Disc Cash Flow [PVAF @ 10% for) 5 years 3.7908]	2,27,448

Therefore, rejection of project would lead to loss of US \$2,27,448 on account of exports to UAE.

Case II:**Acceptance of Project**

Particulars	Amount (US \$)
NPV of the project, if accepted	4,92,784
Loss due to rejection of project	2,27,448
Net gains-US \$ [4,92,784 - 2,27,448]	2,65,336

Illustration 27

A professional accountancy institute in the U.K is evaluating an investment project overseas in East Asia, a politically stable country. The project involves the establishment of a training school to offer courses on international accounting and management topics. It will cost an initial 2.5 million East Asian Dollars (EA \$) and it is expected to earn post tax flows as follows:

Years	1	2	3	4
Cash flow (EA\$ 000)	1750	950	1250	1350

The following information is available:

- The expected inflation rate in East Asia is 3 % a year.
- Real interest rates in the two countries are same, and are expected to remain so for the period of project.
- The current spot rate is EA \$ 2 per £ 1 sterling.
- The risk free rate of interest in East Asia is 7 % and in the UK 9 %.
- The company requires a sterling return from this project of 16 %.

Requirement: Calculate the £ sterling net present value of this project using both the following method;

- By discounting annual cash flows in £ sterling
- By discounting annual cash flows in Eastasian \$.

Solution:**1. Calculation of Future Spot Rates (Interest Rate Parity Theory)**

$$\text{Future Spot rate} = \text{Opening Spot rate} \times \frac{(1 + \text{Home Currency Interest Rate i.e. EA })}{(1 + \text{Foreign Currency Interest Rate i.e. £)}}$$



Year	Opening Spot Rate(EA/ USD)	Closing Spot Rate
1	EA 2.0000	$EA\ 2.0000 \times (1 + 0.07)/(1 + 0.09) = EA\ 1.9633$
2	EA 1.9633	$EA\ 1.9633 \times (1 + 0.07)/(1 + 0.09) = EA\ 1.9273$
3	EA 1.9273	$EA\ 1.9273 \times (1 + 0.07)/(1 + 0.09) = EA\ 1.8919$
4	EA 1.8919	$EA\ 1.8919 \times (1 + 0.07)/(1 + 0.09) = EA\ 1.8572$

2. Computation of Discount Rate for EA Cash Flows

Process: $\Rightarrow$ Ascertaining inflation rate for C (under Purchasing Power Parity Theory)

$\Rightarrow$ Ascertaining real return required for the project (i.e. eliminating the effect of inflation on USD Rate of Return of 16%)

$\Rightarrow$ Applying EA inflation rate of 3% on real rate of return to ascertain Discount Rate for Cash Flows

Reason Since real rate is same in both the countries, the discount rate should adjusted only for inflation difference.

Particulars	Computation
Inflation Rate for UK	$\text{Future Spot Rate} = \frac{\text{Spot Rate} \times (1 + \text{Home Currency Inflation Rate})}{(1 + \text{Foreign Currency Inflation Rate})}$ $\Rightarrow EA\ 1.9633 = \frac{EA\ 2.00 \times (1 + 3\%)}{(1 + \text{UK Inflation Rate})}$ $\Rightarrow (1 + \text{UK Inflation Rate}) = \frac{EA\ 2.00 \times 1.03}{EA\ 1.9633} = 1.0493$ $\Rightarrow \text{UK Inflation Rate} = 1.0493 - 1 = 0.0493 \text{ or } 4.93\%$
Real rate return for Project	$(1 + \text{Discount Rate}) = (1 + \text{Real Rate}) \times (1 + \text{Inflation Rate})$ $\Rightarrow (1 + 16.00\%) = (1 + \text{Real Rate}) \times (1 + 4.93\%)$ $\Rightarrow (1 + \text{Real Rate}) = \frac{1.16}{1.0493} = 1.1055$ $\Rightarrow \text{Real Rate} = 1.1055 - 1 = 0.01055 \text{ or } 10.55\%$
Discount Rate for EA Cash Flows	$(1 + \text{Discount Rate}) = (1 + \text{Real Rate}) \times (1 + \text{Inflation Rate})$ $\Rightarrow (1 + \text{Discount Rate}) = (1 + 10.55\%) \times (1 + 3\%)$ $\Rightarrow (1 + \text{Discount Rate}) = 1.1055 \times 1.03 = 1.1387$ $\Rightarrow \text{Discount Rate} = 1.1387 - 1 = 0.1387 \text{ or } 13.87\%$

Alternatively, extending the Interest Rate Parity Theory to difference in Discount Rates (since the real rate of interest is same in both the countries)

$\Rightarrow$ Future Spot Rate = $\frac{\text{Spot Rate} \times (1 + \text{Home Currency Discount Rate})}{(1 + \text{Foreign Currency Discount Rate})}$

$\Rightarrow EA\ 1.9633 = \frac{EA\ 2.00 \times (1 + EA\ \text{Discount Rate})}{(1 + 16\%)}$

$\Rightarrow 1 + EA\ \text{Discount Rate} = \frac{EA\ 1.9633 \times 1.16}{EA\ 2.00} = 1.1387$

$\Rightarrow EA\ \text{Discount Rate} = 1.1387 - 1$

$\Rightarrow EA\ \text{Discount Rate} = 0.1387 \text{ or } 13.87\%$

3. Computation of NPV by discounting EA Cash Flows

(Assuming that cash flows are in money terms i.e. adjusted for inflation)

Year	Cash Flow EA	PV Factor @ 13.87%	Discounted Cash Flow (EA)
0	(250.00)	1.0000	(250.0000)
1	75.00	0.8782	65.8650
2	95.00	0.7712	73.2640
3	125.00	0.6773	84.6625
4	135.00	0.5948	80.2980
Net Present Value			54.0895

Net Present Value in USD Terms = EA 54.0895 ÷ EA 2 / £ = **£ 27.0448**

Year	Cash Flow (EA)	Conversion Rate	Cash Flow (₹)	PV Factor @ 16.00%	Discounted Cash Flow (₹)
0	(250.00)	EA 2.0000	(500.00)	1.000	(500.0000)
1	75.00	EA 1.9633	147.2475	0.8621	126.9421
2	95.00	EA 1.9273	183.0935	0.7432	136.0751
3	125.00	EA 1.8919	236.4875	0.6407	151.5175
4	135.00	EA 1.8572	250.722	0.5523	138.4738
Net Present Value					53.0085

Illustration 28.

AGIP Ltd., is a supplier of leather goods to retailers in the UK and other Western European countries. The company is considering entering into a joint venture with a manufacturer in South America. The two companies will each own 50 per cent of the limited liability company JV (SA) and will share profits equally. £450,000 of the initial capital is being provided by AGIP Ltd., and the equivalent in South American dollars (SA \$) is being provided by the foreign partner. Manager of the Joint Venture expects the following net operating cash flows, which are in nominal terms. SA \$ 000 forward rates of exchange to the Sterling

Year 1	4,250	10
Year 2	6,500	15
Year 3	8,350	21

For tax reasons JV (SV) the company to be formed specifically for the joint venture, will be registered in South America. Ignore taxation in your calculations.

Assume you are financial adviser retained by AGIP limited to advise on the proposed joint venture. Calculate the NPV of the project under the two assumptions explained below. Use a discount rate of 16 % for both assumptions.

- **Assumptions 1:** The South American country has exchange controls which prohibit the payment of dividends above 50 per cent of the annual cash flows for the first three years of the project. The accumulated balance can be repatriated at the end of the third year.
- **Assumption 2:** The Government of the South American country is considering removing exchange controls and restriction on repatriation of profits. If this happens all cash flows will be distributed as dividends to the partner companies at the end of each year.

Comment briefly on whether or not the joint venture should proceed based solely on these calculations.



Solution:

1. With exchange controls: [Amount in 000s]

Year	PAT SA \$	AGIP share SA \$	50%div SA \$	AGIP share £	Disc Factor @ 16 %	DCFAT £
0				(450)	1.000	(450)
1	4,250	2,125	1,062	106	0.862	91
2	6,500	3,250	1,625	108	0.743	80
3	8,350	4,175	2,088	100	0.641	64
			4,775	227	0.641	146
Net Present value						(69)

Exchange controls removed and all earnings distributed as dividends [Amount in 000s].

Year	PAT SA \$	AGIP share SA \$	AGIP Share in £	Disc Factor @ 16%	DCFAT £
0			(450)	1.000	(450)
1	4,250	2,125	212	0.862	183
2	6,500	3,250	217	0.743	161
3	8,350	4,175	199	0.641	127
Net present value					21

3. If exchange controls exist, in the South American Country the project has a negative and should not be undertaken, Investing in countries with a history of high inflation and political volatility adds to the risk of the project and AGIP Ltd., should proceed with caution.

Illustration 29.

Nelon Company a UK Company is considering undertaking a new project in Australia. The project would require immediate capital expenditure of A \$10 Lakhs, plus A \$ 5 Lakhs of working capital which would be recovered at the end of the project's four year life. The net cash flows expected to be generated from the project are A \$ 13 Lakhs before tax. Straight line depreciation over the life of the project is an allowable expense against company tax in Australia, which is charged at the rate of 50 % payable at each year without delay. The project will have zero scrap value.

Nelon Company will not have to pay any UK tax on the project due to a double taxation avoidance agreement.

The A \$/ UKP spot rate is 2.0 and A \$ is expected to depreciate against the UKP by 10 % per year. A similar risk, UK - based project would be expected to generate a minimum return of 20 % after tax.

Evaluate the Cash Flows of the Project in £ and A \$ and Comment on the same.

Solution:

1. Computation of NPV

[Amount in Lakhs]

Year	CFAT(in A \$)	Exchange Rate	Net CFAT £	Disc factor @ 20%	DCFAT £
1	7.75	2.00 + 10% = 2.20	3.52	0.8333	2.9332
2	7.75	2.20 + 10% = 2.42	3.20	0.6944	2.2221
3	7.75	2.42 + 10% = 2.66	2.91	0.5787	1.6840
4	12.75	2.66 + 10% = 2.93	4.35	0.4823	2.0980
Total DCFAT					8.9373
Less: Initial Investment [A \$ 15 ÷ 2.00 = £ 7.50]					(7.50)
Net Present Value					1.4373

2. Cash flow for the project lifespan of years 1 to 3

Particulars	Amount(A \$ Lakhs)
Contribution	13.00
Less: Depreciation [10 Lakhs/4 Years]	(2.50)
Profit Before Tax [PBT]	10.50 (5.25)
Less: Taxes at 50%	
Profit After Tax [PAT]	5.25 2.50
Add: Depreciation	
Cash Flow After Tax	7.75

3. Cash Flow during Year 4

Particulars	Amount(A \$ Lakhs)
Cash Flow After Tax (CFAT from 2 above)	7.75
Add: Repayment of Working Capital	5.00
Total Cash Flow in Year 5	12.75

4. Using Interest Rate Parity Method,

Forward Rate = Spot Rate X (1+Annual Discount Rate in Australia) ÷ (1+Annual Discount Rate-in UK)

2.20 = 2.00 x (1 +20%)/(1 + Annual Interest Rate in UK)

Annual Interest Rate in UK = 2.20 X 1.20 ÷ 2.00 = 32%

5. Discounting the currency cash flows at this discount rate:

Year	A \$ Lakhs	DF @ 32%	A \$ NPV
1	7.75	0.7576	5.8714
2	7.75	0.5740	4.4585
3	7.75	0.4348	3.3697
4	12.75	0.3294	4.1999
Total DCFAT			17.8995
Less: Initial Investment			(15.00)
Net Present Value [in A \$]			2.8895
NPV in £ [2.8890 ÷ 2]			1.44975

Conclusion: Since NPV under is approx same. Interest Rate Parity Theory holds true.

Illustration 30.

WIM Ltd., a highly profitable and tax paying company is planning to expand its present capacity by 100%. The estimated cost of the project is ₹ 1,000 Lakhs out of which ₹ 500 lakhs is to be met out of loan funds. The company has received two offers from their bankers:

	Option 1	Option 2
Value of loan	₹ 500 lakhs	US \$ 14 lakhs equal to ₹ 500 lakhs
Interest	15% payable yearly	6% payable (Fixed) yearly in US \$
Period	5 years	5 years
Repayment	(In 5 instalments. First installment is payable 1 year after draw down)	—
Other expenses (to be treated as revenue expenditure)	1% of the value of the loan	1 % at US \$ = ₹ 36 (Average)
Future exchange rate	—	End of 1 year 1US \$ = ₹ 38 thereafter to increase by ₹ 2 per annum.



The company is liable to pay Income Tax at 35% and eligible for 25% depreciation on W.D value. You may assume that at the end of 5th year the company will be able to claim balance in WDV for tax purposes. The company follows IT Act method for accounting changes in Foreign Exchange Rate.

Required:

- (1) Compare the total outflow of cash under the above options.
- (2) Using discounted cash flow techniques, evaluate the above offers.
- (3) Is there any risk, which the company should take care of?
- (4) In case WIM has large volume of exports would your advice be different.

Discount Rates to be used for Years 1 to 5 are — 0.921, 0.848, 0.781, 0.720 and 0.663

Solution:

1. Cash Flows under Option I (₹ in Lakhs)

Years	Principal Repayment	Interest @ 15%	Other expenses	Tax savings	Net outflow	Disc factor	DCFAT
0	-	-	5.00	1.75	3.25	1.000	3.25
1	100	75	-	26.25	148.75	0.921	137.00
2	100	60	-	21.00	139.00	0.848	117.87
3	100	45	-	15.75	129.25	0.781	100.94
4	100	30	-	10.50	119.50	0.720	86.04
5	100	15	-	5.25	109.75	0.663	72.76
Total Cash Outflows							517.86

2. Option II

(a) Statement of Principal, Interest and Other Charges in Rupees and US \$

[₹ In Lakhs]

Exchange Rate	Year	Cash Flow in US \$				Cash flow in ₹				
		Principal	Int. @ 6%	Charges	Total	Principal	Premium	Interest	Charges	Total
36/USD	0	-	-	0.140	0.140	-	-	-	5.04	5.04
38/ USD	1	2.8	0.840	-	3.640	100.00	6.4 [2.8 X 38 - 100]	31.920	-	138.32
40 / USD	2	2.8	0.672	-	3.472	100.00	12.0 [2.8 X 40 - 100]	26.880	-	138.88
42/ USD	3	2.8	0.504	-	3.304	100.00	17.6 [2.8 X 4.2 - 100]	21.168	-	138.768
44/ USD	4	2.8	0.336	-	3.136	100.00	23.2 [2.8 X 44 - 100]	14.784	-	137.984
46 / USD	5	2.8	0.168	-	2.968	100.00	28.8 [2.846 - 100]	7.728	-	136.528
		14.0	2.520	0.140	16.660	500.00	88.00	102.48	5.04	695.520

Note:

- The amount of Premium paid on Exchange Rate Difference = [Principal Repayment in US \$ X Exchange Rate] Less Amount of Principal Repayment in Rupees.
- As per IT Act, the-premium paid on exchange rate difference on loans acquired for the purpose of capital expenditure, should be capitalized.

(b) Statement showing Tax Savings on Depreciation on Premium

Year	Opening value	Premium	Total	Depreciation on premium [Note2]	Tax savings at 35 %	Closing WDV
1	-	6.40	6.40	1.60	0.56	4.80
2	4.80	12.00	16.80	4.20	1.47	12.60
3	12.60	17.60	30.20	7.55	2.64	22.65
4	22.65	23.20	45.85	11.46	4.01	34.39
5	34.39	28.80	63.19	63.19	22.11	Nil

Note: The rates of Depreciation on Premium are —

- Years 1 - 4 = 25% (Given)
- Year 5 = 100% (The Full benefit is claimed in the last year)

c) Cash Flows under Option II

Year	Interest & Other charges	Tax Savings on		Total tax savings	Gross Outflow	Net out flow	Disc factor	DCFAT
		interest & Other Charges	Depreciation on premium					
0	5.040	1.764	-	1.764	5.040	3.276	-	3.276
1	31.920	11.172	0.560	11.732	138.320	126.588	0.921	116.588
2	26.880	9.408	1.470	10.878	138.880	128.002	0.848	108.546
3	21.168	7.408	2.640	10.048	138.768	128.720	0.781	100.530
4	14.784	5.174	4.010	9.184	137.984	128.800	0.720	92.736
5	7.728	2.704	22.110	24.814	136.528	111.714	0.663	74.066
Total Cash Outflows								495.742

Inference:

- The Total Cash Outflows under Option II is lesser than the Cash Flows under Option I.
- However, the company has to be careful about future exchange rate.
- The company should hedge its foreign exchange risks and then work out the value.
- In case the company has good volume of exports, then it may help the company to hedge the future payments with outflow.

Illustration 31.

M/s Omni Electronics Ltd. exports air conditioners to Germany by importing all the components from Singapore. The Company is exporting 2,400 units at a price of Euro 500 per unit. The cost of the imported components is S \$ 800 per unit; The fixed cost and other variable cost per unit are ₹ 1,000 and ₹ 1,500 respectively. The cash Flows in Foreign currencies are due in six months.

The current exchange rates are as follows: ₹ /Euro - 51.50/55 ; ₹ /S\$ 27.20/25. After six months the exchange rates turn out as follows: ₹ /Euro 52.00/05, ₹ /S\$ 27.70/75.

1. Calculate Loss / Gain due to transaction Exposure
2. Based on the following additional information calculate the loss / gain due to transaction and operating exposure if the contracted price of air conditioners is ₹ 25,000:
 - (a) The current exchange rate changes to - ₹ /Euro 51.75/80, ₹ /S\$ 27.10/15.
 - (b) Price Elasticity of Demand is estimated to be 1.5
 - (c) Payments and receipts are to be settled at the end of six months.

**Solution:****1. Gain or Loss due to Transaction Exposure**

Particulars (1)	Foreign Currency (2)	Relevant Rate (3)	Forward Rate (4)	Spot Rate (5)	Difference (6) = (4)-(5)	Transaction Exposure (7) = (6)x(2)
Sale Revenue	12,00,000 (2,400 x 500)	Bid Rate	₹ 52 (₹ /USD)	₹ 51.50	₹ 0.50	₹ 6,00,000
Purchases	\$ 19,20,000 (2400 x \$ 800)	Ask Rate	₹ 27.75 (₹ /\$)	₹ 27.25	₹ 0.50	(₹ 9,60,000)
Net Gain/(Loss) due to Exchange Rate difference = Net Transaction Exposure						(₹ 3,60,000)

2. Gain or Loss due to Transaction and Operating Exposure in Revised Conditions**(a) Basic Data**

Particulars	Value
Revised Selling Price	₹ 25,000
Spot Bid rate for Euros	₹ 51.75
Contracted Price in Euro = Revised Selling Price / Spot Bid rate	483 Euros
Existing Sale Price	500 Euros
Decrease in Selling Price = (500 - 483) Euros	17 Euros
Percentage Decrease in Price = 17 ÷ 500	3.4%
Price elasticity of Demand	1.5
Percentage Increase in Sales = Percentage Decrease in Price X Price Elasticity	5.1%
Increase in Sale Quantity = Original Sales Quantity X Percentage Increase	122 units
Revised Sales Quantity	2522 Units
Revised Sale Proceeds = Revised Sales Quantity X Revised Selling Price	₹ 6,30,60,000

(b) Computation of Operating Exposure

Operating Exposure = Exposure due to Market Conditions

Particulars	₹
Incremental Sales Revenue from New Sales = ₹ 25000 x 122 units	30,50,000
Incremental Material Costs = \$ 800 X 27.15 x 122 units	(26,49,840)
Incremental Variable Costs = ₹ 1500 x 122 units	(1,83,000)
Incremental Contribution	2,17,160
Loss in Revenue From Existing Sales = (483 -500) x ₹ 51.75 X 2400 units	(21,11,400)
Operating Exposure	(18,94,240)

Note: For computing Loss in Revenue from Existing Sales only Spot Rate is taken since the Risk of Foreign Currency Fluctuations rests with the Importer and not the Exporter due to Home Currency Invoicing.

(c) Computation of Transaction Exposure

Transaction Exposure = \$ 800 x 2,522 units x (27.75 - 27.15)
= ₹ 12,10,560.

Note: Only the purchase price to be paid varies in the instant case due to exchange rate differences. Since the price is quoted in Rupees, Transaction exposure does not arise due to Home Currency Invoicing.

Illustration 32

You as a dealer in foreign exchange has the following position in Swiss Francs on 31.10.2004-

Particulars	SFr.	Particulars	SFr.
Balance in the Nostro A/c Credit	1,00,000	Forward purchase contract cancelled	30,000
Opening Position Over bought	50,000	Remitted by TT	75,000
Purchased a bill on Zurich Sold forward TT	80,000	Draft on Zurich cancelled	30,000
	60,000		

What steps would Mr. Sen take, if he required to maintain a credit balance of S Fr. 30,000 in the Nostro A/c and keep as over bought position on SFr. 10,000?

Solution:

Particulars	Sw. Frcs	Particulars	Sw.Frcs
To Balance b/d	50,000	By Sales of Forward TT	60,000
To Purchase of Bill on Zurich	80,000	By Forward Purchase Contract Cancellation	30,000
To Cancellation of Draft	30,000	By Remittance by TT (Nostro)	75,000
To Buy Spot TT (Nostro)	5,000	By Balance c/ d (Given)	10,000
To Buy Forward (To maintain Balance)	10,000		
	1,75,000		1,75,000

Dr.	Nostro Account		Cr.
Particulars	Sw. Frcs	Particulars	Sw. Frcs
To Overbought Remittance	75,000	By Balance b/d	1,00,000
To Balance c/d	30,000	By Buy Spot TT (To maintain Balance)	5,000
	1,05,000		1,05,000

Courses of Action

- The Bank has to buy spot TT Sw. Fcs. 5,000 to increase the balance in Nostro Account to Sw. Fcs. 30,000.
- Since the bank requires an overbought position of Sw. Fcs. 10,000, it has to buy forward Sw. Fcs. 10,000.



Section C

Security Analysis & Portfolio Management



Study Note - 9

SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT



This Study Note includes

- 9.1 Investment – Basics and Analysis of Securities**
- 9.2 Market Indicators, Support and Resistance level, Patterns in Stock Price**
- 9.3 Statistic Models, Bollinger Bands**
- 9.4 Portfolio Management**
- 9.5 Theories on Stock Market Movements**
- 9.6 Risk Analysis**
- 9.7 Portfolio Analysis**

9.1 INVESTMENT – BASICS AND ANALYSIS OF SECURITIES

Investment is putting money into something with the expectation of profit. The word originates in the Latin “vestis”, meaning garment, and refers to the act of putting things (money or other claims to resources) into others’ pockets.

The term “investment” is used differently in economics and in finance. Economists refer to a real investment (such as a machine or a house), while financial economists refer to a financial asset, such as money that is put into a bank or the market, which may then be used to buy a real asset.

9.1.1 Financial Meaning of Investment

- ❖ Financial investment involves of funds in various assets, such as *stock, Bond, Real Estate, Mortgages* etc.
- ❖ Investment is the employment of funds with the aim of achieving additional income or growth in value.
- ❖ It involves the commitment of resources which have been saved or put away from current consumption in the hope some benefits will accrue in future. Investment involves long term commitment of funds and waiting for a *reward in the future*.
- ❖ From the point of view people who invest their finds, they are the supplier of ‘Capital’ and in their view investment is a commitment of a person’s funds to derive future income in the form of interest, dividend, rent, premiums, pension benefits or the appreciation of the value of their principle capital.
- ❖ To the financial investor it is not important whether money is invested for a productive use or for the purchase of secondhand instruments such as existing shares and stocks listed on the stock exchange.
- ❖ Most investments are considered to be transfers of financial assets from one person to another.

9.1.2 Economic Meaning of Investment

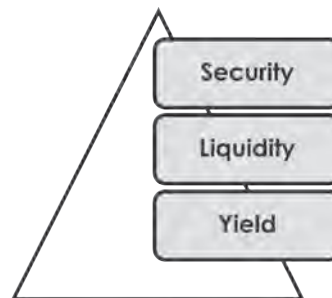
- ❖ Economic investment means the net additions to the capital stock of the society which consists of goods and services that are used in the production of other goods and services. Addition to the capital stock means an increase in building, plants, equipment and inventories over the amount of goods and services that existed.

- ❖ The financial and economic meanings are related to each other because investment is a part of the savings of individuals which flow into the capital market either directly or through institutions, divided in 'new' and secondhand capital financing. Investors as 'suppliers' and investors as 'users' of long-term funds find a meeting place in the market.

9.1.3 Basic Investment Objectives

Investment triangle – three compromising objectives

Any investment decision will be influenced by three objectives – security, liquidity and yield. A best investment decision will be one, which has the best possible compromise between these three objectives.



Individually these objectives are very powerful in influencing the investors. Collectively they work against each other forcefully, as can be seen below. Hence the acclaim – A best investment decision will be one, which has the best possible compromise between these three objectives.

When selecting where to invest our funds we have to analyze and manage these three objectives.

❖ **Security:**

Central to any investment objective, we have to basically ensure the safety of the principal. One can afford to lose the returns at any given point of time but s/he can ill afford to lose the very principal itself. By identifying the importance of security, we will be able to identify and select the instrument that meets this criterion. For example, when compared with corporate bonds, we can vouch safe the safety of return of investment in treasury bonds as we have more faith in governments than in corporations. Hence, treasury bonds are highly secured instruments. The safest investments are usually found in the money market and include such securities as Treasury bills (T-bills), certificates of deposit (CD), commercial paper or bankers' acceptance slips; or in the fixed income (bond) market in the form of municipal and other government bonds, and in corporate bonds

❖ **Liquidity:**

Because we may have to convert our investment back to cash or funds to meet our unexpected demands and needs, our investment should be highly liquid. They should be en cashable at short notice, without loss and without any difficulty. If they cannot come to our rescue, we may have to borrow or raise funds externally at high cost and at unfavorable terms and conditions. Such liquidity can be possible only in the case of investment, which has always-ready market and willing buyers and sellers. Such instruments of investment are called highly liquid investment.

❖ **Yield:**

Yield is best described as the net return out of any investment. Hence given the level or kind of security and liquidity of the investment, the appropriate yield should encourage the investor to go for the investment. If the yield is low compared to the expectation of the investor, s/he may prefer to avoid such investment and keep the funds in the bank account or in worst case, in cash form in lockers. Hence yield is the attraction for any investment and normally deciding the right yield is the key to any investment.

Relationship:

- ❖ There is a tradeoff between risk (security) and return (yield) on the one hand and liquidity and return (yield) on the other.
- ❖ Normally, higher the risk any investment carries, the greater will be the yield, to compensate the possible loss. That is why, 'fly by night' operators, offer sky high returns to their investors and naturally our gullible investors get carried away by such returns and ultimately lose their investment. Highly secured investment does not carry high coupon, as it is safe and secured.
- ❖ When the investment is illiquid, (i.e. one cannot get out of such investment at will and without any loss) the returns will be higher, as no normal investor would prefer such investment.
- ❖ These three points – security, liquidity and yield in any investment – make an excellent triangle in our investment decision-making. Ideally, with given three points of any triangle, one can say the center of the triangle is fixed. In our investment decision too, this center – the best meeting point for S, L and Y – is important for our consideration.
- ❖ However, if any one or two of these three points are disturbed – security, liquidity and yield in any investment – the center of the triangle would be disturbed and one may have to revisit the investment decision – either to continue the investment or exit the investment.
- ❖ All these points – security, liquidity and yield – are highly dynamic in any market and they are always subject to change and hence our investor has to periodically watch his/her investment and make appropriate decisions at the right time.
- ❖ If our investor fails to monitor her / his investment, in the worst circumstances, s/he may lose the very investment.
- ❖ Thus, we will return to our original statement - A best investment decision will be one, which has the best possible compromise between these three objectives – security, liquidity and yield.

Secondary Objectives:

❖ Tax Minimization:

An investor may pursue certain investments in order to adopt tax minimization as part of his or her investment strategy. A highly-paid executive, for example, may want to seek investments with favorable tax treatment in order to lessen his or her overall income tax burden.

❖ Marketability / Liquidity:

Many of the investments we have discussed are reasonably illiquid, which means they cannot be immediately sold and easily converted into cash. Achieving a degree of liquidity, however, requires the sacrifice of a certain level of income or potential for capital gains.

Common stock is often considered the most liquid of investments, since it can usually be sold within a day or two of the decision to sell. Bonds can also be fairly marketable, but some bonds are highly illiquid, or non-tradable, possessing a fixed term. Similarly, money market instruments may only be redeemable at the precise date at which the fixed term ends. If an investor seeks liquidity, money market assets and non-tradable bonds aren't likely to be held in his or her portfolio.

9.1.4 Security Analysis

Security is an instrument of promissory note or a method of borrowing or lending, or a source of contributing to the funds needed by the corporate body or non-corporate body.

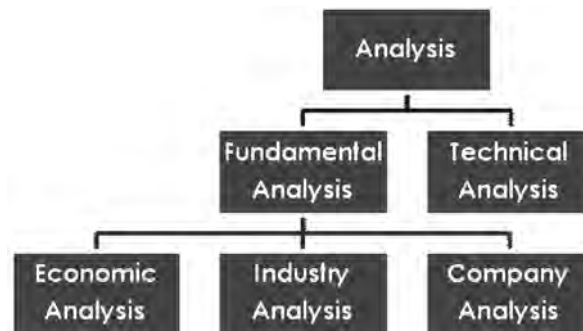
Portfolio is a combination of securities with different risk-return characteristics will constitute portfolio of the investor.

Security analysis is the first part of investment decision process involving the valuation and analysis of individual securities. Security Analysis is primarily concerned with the analysis of a security with a view

to determine the value of the security, so that appropriate decisions may be made based on such valuation as compared with the value placed on the security in the market.

Two basic approaches of security analysis are fundamental analysis and technical analysis.

The analysis may be on the following lines:



Security Analysis is based on the following parameters:-

- (i) **Fundamental Analysis:** This involves the determination of the intrinsic value of the Share based on the Company's profits and dividend expectations.
 - ❖ **Economic Analysis:** It is concerned with the analysis of the overall economy, of which the entity is a part. Economic analysis is used to forecast National Income with its various components that have a bearing on the concerned industry and the company in particular.
 - ❖ **Industry Analysis:** It involves analysis of the specific industry to which the company belongs as against analysis of the economy as a whole.
 - ❖ **Company Analysis:** Economic and industry framework provides the investor with proper background against which shares of a particular company are purchased. Company Analysis requires the assessment of the particular company in which the investment is sought to be made. This requires careful examination of the company's quantitative and qualitative fundamentals.
- (ii) **Technical Analysis:** Technical Analysis is concerned with the fundamental strength or weakness of a company or an industry; as reflected by investor and price behaviour. It is the study and analysis of Security Price movements on the following assumptions —
 - ❖ There is a basic trend in the share price movements
 - ❖ Such trend is repetitive.
 - ❖ Share prices have little relationship with Intrinsic Value and based more on investor psychology and perception.

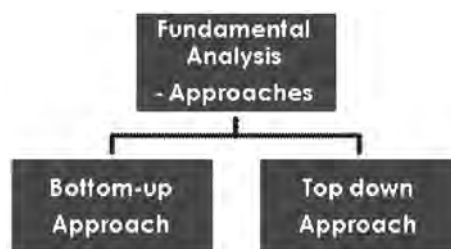
The purpose is to make an in-depth analysis of the company and its relative strength with reference to other companies in the industry, the investor decides whether he should buy or sell the securities of the company.

A detailed explanation is made hereunder:

9.1.4.1. Fundamental Analysis

Fundamental analysis is used to determine the intrinsic value of the share by examining the underlying forces that affect the well being of the economy, Industry groups and companies. Fundamental analysis is to first analyze the economy, then the Industry and finally individual companies. This is called as top down approach.

The actual value of a security, as opposed to its market price or book value is called intrinsic value. The intrinsic value includes other variables such as brand name, trademarks, and copyrights that are often difficult to calculate and sometimes not accurately reflected in the market price. One way to look at it is that the market capitalization is the price (i.e. what investors are willing to pay for the company) and intrinsic value is the value (i.e. what the company is really worth).



- ❖ **Bottom-up approach**, where investors focus directly on a company's basic. Analysis of such information as the company's products, its competitive position and its financial status leads to an estimate of the company's earnings potential and ultimately its value in the market. **The emphasis in this approach is on finding companies with good growth prospect, and making accurate earnings estimates.** Thus bottom-up fundamental research is broken in two categories: **growth investing** and **value investing**

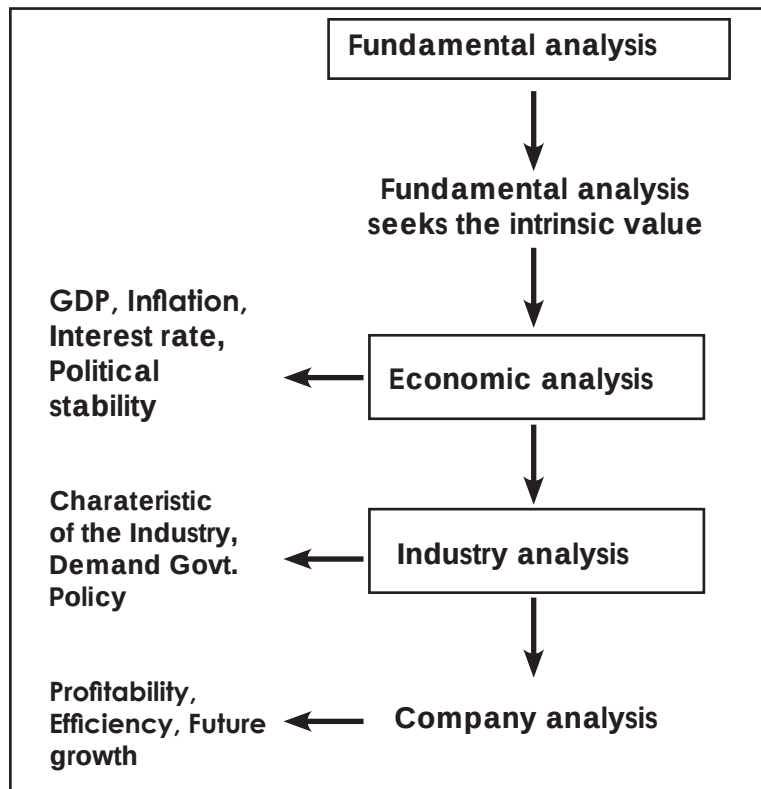
- ✓ **Growth Stock:**

It carry investor expectation of above average future growth in earnings and above average valuations as a result of high price/earnings ratios. Investors expect these stocks to perform well in future and they are willing to pay high multiples for this expected growth.

- ✓ **Value Stock:** Features cheap assets and strong balance sheets.

In many cases, bottom-up investing does not attempt to make a clear distinction between growth and value stocks. Top-down approach is better approach.

❖ **Top down approach**



The top down approach of fundamental analysis

- ❖ At the economy level, fundamental analysis focus on economic data (such as GDP, Foreign exchange and Inflation etc.) to assess the present and future growth of the economy.
- ❖ At the industry level, fundamental analysis examines the supply and demand forces for the products offered.
- ❖ At the company level, fundamental analysis examines the financial data (such as balance sheet, income statement and cash flow statement etc.), management, business concept and competition. In order to forecast the future share price, fundamental analysts combines the economic, industry and company analysis. If the intrinsic value is lower than the current value, fundamental analysis recommends to buy the share and the vice versa is also true.

Economic analysis

Economic analysis occupies the first place in the financial analysis top down approach. When the economy is having sustainable growth, then the industry group (Sectors) and companies will get benefit and grow faster. The analysis of macroeconomic environment is essential to understand the behavior of the stock prices.

The commonly analysed macro economic factors are as follows:-

- ❖ **Gross domestic product (GDP):** GDP indicates the rate of growth of the economy. GDP represents the value of all the goods and services produced by a country in one year. The higher the growth rate is more favourable to the share market.
- ❖ **Savings and investment:** The economic growth results in substantial amount of domestic savings. Stock market is a channel through which the savings of the investors are made available to the industries. The savings and investment pattern of the public affect stock market.

- ❖ **Inflation:** Along with the growth of GDP, if the inflation rate also increases, then the real rate of growth would be very little. The decreasing inflation is good for corporate sector.
- ❖ **Interest rates:** The interest rate affects the cost of financing to the firms. A decrease in interest rate implies lower cost of finance for firms and more profitability.
- ❖ **Budget:** Budget is the annual financial statement of the government, which deals with expected revenues and expenditures. A deficit budget may lead to high rate of inflation and adversely affect the cost of production. Surplus budget may result in deflation. Hence, balanced budget is highly favourable to the stock market.
- ❖ **The tax structure:** The tax structure which provides incentives for savings and investments.
- ❖ **The balance of payment:** The balance of payment is the systematic record of all money transfer between India and the rest of the world. The difference between receipts and payments may be surplus or deficit. If the deficit increases, the rupee may depreciate against other currencies. This would affect the industries, which are dealing with foreign exchange.
- ❖ **Monsoon and agriculture:** India is primarily an agricultural country. The importance of agricultural in Indian economy is evident. Agriculture is directly and indirectly linked with the industries. For example, Sugar, Textile and Food processing industries depend upon agriculture for raw material. Fertilizer and Tractor industries are supplying input to the agriculture. A good monsoon leads better harvesting; this in turn improves the performance of Indian economy.
- ❖ **Infrastructure:** Infrastructure facilities are essential for growth of Industrial and agricultural sector. Infrastructure facilities include transport, energy, banking and communication. In India even though Infrastructure facilities have been developed, still they are not adequate.
- ❖ **Demographic factors:** The demographic data provides details about the population by age, occupation, literacy and geographic location. This is needed to forecast the demand for the consumer goods.
- ❖ **Political stability:** A stable political system would also be necessary for a good performance of the economy. Political uncertainties and adverse change in government policy affect the industrial growth.

Techniques Used in Economic Analysis:

(A) Anticipatory Surveys:

- (i) Facilitate investors to form an opinion about the future state of the economy.
- (ii) Incorporates industry surveys on construction activities, expenditure on plant and machinery, levels of inventory - all having a definite bearing on economic activities.
- (iii) Future spending habits of consumers are taken into account.

However, an important limitation is that the survey results do not guarantee that intentions surveyed would materialize. They are not regarded as forecasts per se, as there can be a consensus approach by the investor for exercising his opinion.

(B) Barometer/Indicator Approach: Various indicators are used to find out how the economy shall perform in the future. The indicators have been classified as under:

- (i) **Leading Indicators:** They lead the economic activity in terms of their outcome. They relate to the time series data of the variables that reach high/low points in advance of economic activity.
- (ii) **Roughly Coincidental Indicators:** They reach their peaks and troughs at approximately the same time as the economy.

- (iii) **Lagging Indicators:** They are time series data of variables that lag behind in their consequences vis-à-vis the economy. They reach their turning points after the economy has reached its own already.
- (iv) **Diffusion/composite index:** This index combines several indicators into one index to measure the magnitude of the movement of a particular set of indicators. Computation of diffusion indices are however difficult. Moreover it does not eliminate irregular movements. But this is most useful when the other indicators give conflicting signals and also since they do not measure the magnitude of change.

(C) Economic Model Building Approach: In this approach, a precise and clear relationship between dependent and independent variables is determined. GNP model building or sectoral analysis is used in practice through the use of National Accounting framework. The steps used are as follows:

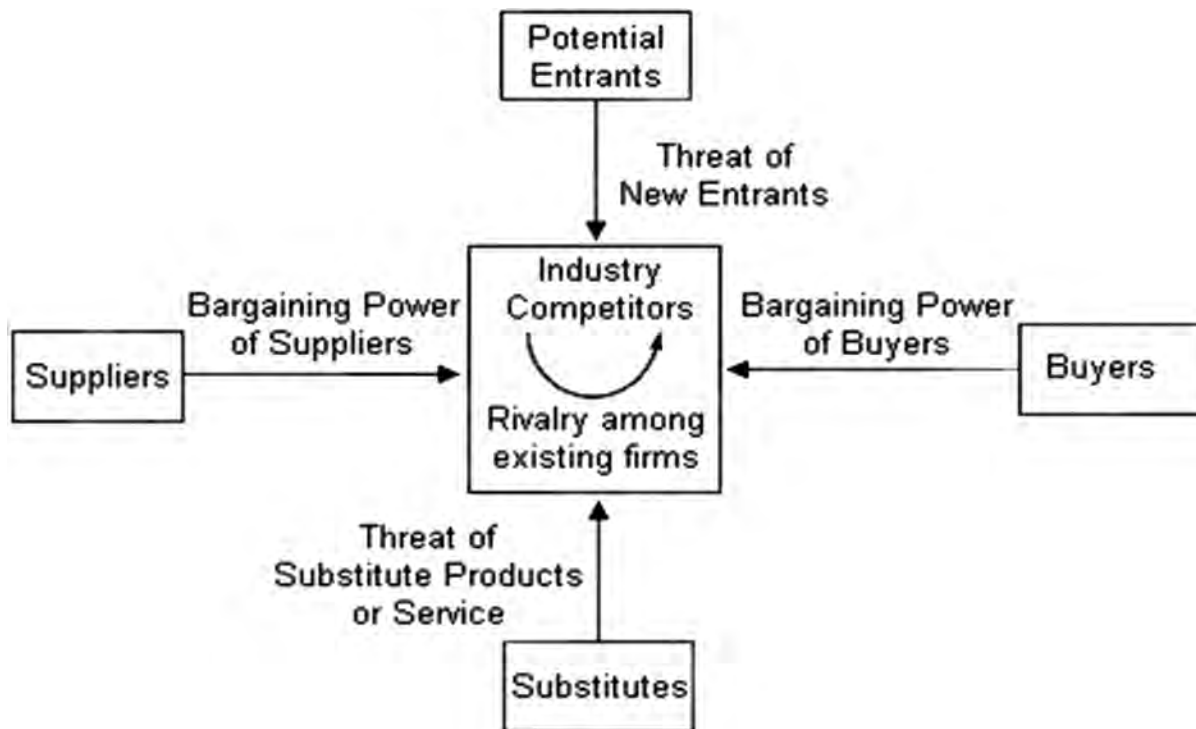
- (i) Hypothesize total economic demand by measuring total income (GNP) based on political stability, rate of inflation, changes in economic levels.
- (ii) Forecast the GNP by estimating levels of various components viz. consumption expenditure, gross private domestic investment, government purchases of goods/services, net exports.
- (iii) After forecasting individual components of GNP, add them up to obtain the forecasted GNP.
- (iv) Comparison is made of total GNP thus arrived at with that from an independent agency for the forecast of GNP and then the overall forecast is tested for consistency.

(D) Gross National Product Analysis: Gross National Product (GNP) as a measure national income reflects the growth rate in economic activities and is regarded as a forecasting tool for analyzing the overall economy along with its various components during a particular period.

Industry or Sector analysis

The second step in the fundamental analysis of securities is Industry analysis. An industry or sector is a group of firms that have similar technological structure of production and produce similar products. These industries are classified according to their reactions to the different phases of the business cycle. They are classified into growth, cyclical, defensive and cyclical growth industry. A market assessment tool designed to provide a business with an idea of the complexity of a particular industry. Industry analysis involves reviewing the economic, political and market factors that influence the way the industry develops. Major factors can include the power wielded by suppliers and buyers, the condition of competitors and the likelihood of new market entrants.

The industry analysis should take into account the following factors:-



- ❖ **Characteristics of the industry:** When the demand for industrial products is seasonal, their problems may spoil the growth prospects. If it is consumer product, the scale of production and width of the market will determine the selling and advertisement cost. The nature of industry is also an important factor for determining the scale of operation and profitability.
- ❖ **Demand and market:** If the industry is to have good prospects of profitability, the demand for the product should not be controlled by the government.
- ❖ **Government policy:** The government policy is announced in the Industrial policy resolution and subsequent announcements by the government from time to time. The government policy with regard to granting of clearances, installed capacity, price, distribution of the product and reservation of the products for small industry etc are also factors to be considered for industrial analysis.
- ❖ **Labour and other industrial problems:** The industry has to use labour of different categories and expertise. The productivity of labour as much as the capital efficiency would determine the progress of the industry. If there is a labour problem that industry should be neglected by the investor. Similarly when the industries have the problems of marketing, investors have to be careful when investing in such companies.
- ❖ **Management:** In case of new industries, investors have to carefully assess the project reports and the assessment of financial institutions in this regard. The capabilities of management will depend upon tax planning, innovation of technology, modernisation etc. A good management will also insure that their shares are well distributed and liquidity of shares is assured.
- ❖ **Future prospects:** It is essential to have an overall picture of the industry and to study their problems and prospects. After a study of the past, the future prospects of the industry are to be assessed.
- ❖ When the economy expands, the performance of the industries will be better. Similarly when the economy contracts reverse will happen in the Industry. Each Industry is different from the other. Cement Industry is entirely different from Software Industry or Textile Industry in its products and process.

Techniques Used in Industry Analysis:

- (i) **Regression Analysis:** Investor diagnoses the factors determining the demand for output of the industry through product demand analysis. The following factors affecting demand are to be considered - GNP, disposable income, per capita consumption / income, price elasticity of demand. These factors are then used to forecast demand using statistical techniques such as regression analysis and correlation.
- (ii) **Input - Output Analysis:** It reflects the flow of goods and services through the economy, intermediate steps in production process as goods proceed from raw material stage through final consumption. This is carried out to detect changing patterns/trends indicating growth/decline of industries.

Company or Corporate analysis

Company analysis is a study of variables that influence the future of a firm both qualitatively and quantitatively. It is a method of assessing the competitive position of a firm, its earning and profitability, the efficiency with which it operates its financial position and its future with respect to earning of its shareholders.

The fundamental nature of the analysis is that each share of a company has an intrinsic value which is dependent on the company's financial performance. If the market value of a share is lower than intrinsic value as evaluated by fundamental analysis, then the share is supposed to be undervalued. The basic approach is analysed through the financial statements of an organisation.

The company or corporate analysis is to be carried out to get answer for the following two questions.

1	How has the company performed in comparison with the similar company in the same Industry?
2	How has the company performed in comparison to the early years?

Before making investment decision, the business plan of the company, management, annual report, financial statements, cash flow and ratios are to be examined for better returns.

SWOT Analysis





Factors considered in Company Analysis are :-

(A) Net Worth and Book Value:

(i) Computation:

Particulars	Amount
Equity Share Capital	XXX
Add: Free Reserves	XXX
Less: Accumulated Losses	(XXX)
Total Net Worth of Business	XXX
Book Value of Share = Total Net Worth Number of Shares Outstanding	XX

(ii) Book Value may not be an indicator of the intrinsic worth of the share, due to the following reasons :-

- ❖ First, the market price of the share reflects the future earnings potential of the firm which may have no relationship with the value of its assets. Example: Service Sector, where intrinsic value is based more on future earning potential than on Asset Backing.
- ❖ Second, the book value is based upon the historical costs of the assets of the firm and these may be gross underestimates of the cost of the replacement or resale values of these assets.

(B) Sources and utilisation of funds:

- The identification of sources and uses of funds is known as Funds Flow and Cash Flow Analysis.
- One of the major uses of Funds Flow Analysis is to find out whether the firm has used Short Term sources of funds to finance Long-Term Investments.
- Such methods of financing increases the risk of liquidity crunch for the firm, as Long-Term Investments, because of the gestation period involved may not generate enough surplus in time to meet the short-term liabilities incurred by the firm. This increases the Credit and Default Risk of the Entity.

(C) Time Series Analysis, Common Sized Statements and Financial Ratio Analysis:

- Financial Statements are utilized to make Inter and Intra Firm Comparison.
- The techniques that are used to do such comparative analysis are: Common-Sized Statements, and Financial Ratio Analysis.

(D) Size and Ranking:

- A rough idea regarding the size and ranking of the company within the economy, in general, and the industry, in particular, would help the investment manager in assessing the risk associated with the company.
- It may also be useful to assess the position of the company in terms of Technical Know-how, Research and Development activity and price leadership.

(E) Growth Record:

- The growth in sales, net income, net capital employed and Earnings per share of the company in the past few years should be examined.
- The following three growth indicators may be looked into in particular:
 - ❖ Price Earnings ratio,
 - ❖ Percentage Growth rate of Earnings per annum, and

- ❖ Percentage growth rate of net block.
- (iii) An evaluation of future growth prospects of the company should be carefully made. This requires an analysis of-
 - ❖ Existing capacities and their utilization which is indicated by the Quantitative information present in the Financials,
 - ❖ Proposed expansion and diversification plans and the nature of the company's technology - which is generally indicated by Director's Reports
- (iv) Growth is the single most important factor in company analysis for the purpose of investment management. A company may have a good record of profits and performance in the past; but if it does not have growth potential, its shares cannot be rated high from the investment point of view.

Techniques Used in Company Analysis:

- (i) **Correlation & Regression Analysis:** Simple regression is used when inter relationship covers two variables. For more than two variables, multiple regression analysis is followed. Here the inter relationship between variables belonging to economy, industry and company are found out. The same is quantified using the correlation co-efficient between the variables and standard deviation of the variables.
- (ii) **Time Series and Trend Analysis:** A Trend line or characteristic line is drawn using the method of least squares to identify and extrapolate the trend obtained based on a given Time Series.
- (iii) **Decision Tree Analysis:** This involves the use of probability to find out the expected value arising out a given course of action. In this method various probabilities are assigned to states of nature and the expected value of a given course of action is determined.

Fundamental Analysis Tools:

Although the raw data of the Financial Statement has some useful information, much more can be understood about the value of a stock by applying a variety of tools to the financial data.

1. Earnings per Share – EPS
2. Price to Earnings Ratio – P/E
3. Projected Earnings Growth – PEG
4. Price to Sales – P/S
5. Price to Book – P/B
6. Dividend Payout Ratio
7. Dividend Yield
8. Book Value per share
9. Return on Equity

1. Earnings per Share

The overall earnings of a company is not in itself a useful indicator of a stock's worth. Low earnings coupled with low outstanding shares can be more valuable than high earnings with a high number of outstanding shares. Earnings per share are much more useful information than earnings by itself. Earnings per share (EPS) is calculated by dividing the net earnings by the number of outstanding shares.



EPS = Net Earnings / Outstanding Shares

For example: ABC company had net earnings of \$1 million and 100,000 outstanding shares for an EPS of 10 ($1,000,000 / 100,000 = 10$). This information is useful for comparing two companies in a certain industry but should not be the deciding factor when choosing stocks.

2. Price to Earnings Ratio

The Price to Earnings Ratio (P/E) shows the relationship between stock price and company earnings. It is calculated by dividing the share price by the Earnings per Share.

$$\text{P/E} = \text{Stock Price} / \text{EPS}$$

In our example above of ABC company the EPS is 10 so if it has a price per share of \$50 the P/E is 5 ($50 / 10 = 5$). The P/E tells you how many investors are willing to pay for that particular company's earnings. P/E's can be read in a variety of ways. A high P/E could mean that the company is overpriced or it could mean that investors expect the company to continue to grow and generate profits. A low P/E could mean that investors are wary of the company or it could indicate a company that most investors have overlooked.

Either way, further analysis is needed to determine the true value of a particular stock.

3. Projected Earnings Growth Rate-PEG Ratio

A ratio used to determine a stock's value while taking into account earnings growth. The calculation is as follows:

$$\text{PEG Ratio} = \frac{\text{Price / Earning Ratio}}{\text{Annual EPS Growth}}$$

PEG is a widely used indicator of a stock's potential value. It is favoured by many over the price/earnings ratio because it also accounts for growth. Similar to the P/E ratio, a lower PEG means that the stock is more undervalued.

Keep in mind that the numbers used are projected and, therefore, can be less accurate. Also, there are many variations using earnings from different time periods (i.e. one year vs. five year). Be sure to know the exact definition your source is using.

4. Price to Sales Ratio

When a company has no earnings, there are other tools available to help investors judge its worth. New companies in particular often have no earnings, but that does not mean they are bad investments. The Price to Sales ratio (P/S) is a useful tool for judging new companies. It is calculated by dividing the market cap (stock price times number of outstanding shares) by total revenues. An alternate method is to divide current share price by sales per share. P/S indicates the value the market places on sales. The lower the P/S the better the value.

$$\text{PSR} = \frac{\text{Share Price}}{\text{Revenue Per share}}$$

5. Price to Book Ratio

Book value is determined by subtracting liabilities from assets. The value of a growing company will always be more than book value because of the potential for future revenue. The price to book ratio (P/B) is the value the market places on the book value of the company. It is calculated by dividing the current price per share by the book value per share (book value / number of outstanding shares). Companies with a low P/B are good value and are often sought after by long term investors who see the potential of such companies. A lower P/B ratio could mean that the stock is undervalued. However, it could also mean that something is fundamentally wrong with the company. As with most ratios, be aware that this varies by industry. This ratio also gives some idea of whether you're paying too much for what would be left if the company went bankrupt immediately. It is also known as the "price-equity ratio".

P/B = Share Price / Book Value per Share

$$\text{P/B Ratio} = \frac{\text{Stock Price}}{\text{Total Assets} - \text{Intangible Assets and Liabilities}}$$

6. Dividend Yield

Some investors are looking for stocks that can maximize dividend income. Dividend yield is useful for determining the percentage return a company pays in the form of dividends. It is calculated by dividing the annual dividend per share by the stock's price per share. Usually it is the older, well-established companies that pay a higher percentage, and these companies also usually have a more consistent dividend history than younger companies. Dividend yield is calculated as follows:

$$\text{Dividend yield} = \frac{\text{Annual Dividends Per Share}}{\text{Price Per Share}}$$

Dividend yield is a way to measure how much cash flow you are getting for each dollar invested in an equity position - in other words, how much "bang for your buck" you are getting from dividends. Investors who require a minimum stream of cash flow from their investment portfolio can secure this cash flow by investing in stocks paying relatively high, stable dividend yields.

To better explain the concept, refer to this dividend yield example: If two companies both pay annual dividends of \$1 per share, but ABC Company's stock is trading at \$20 while XYZ Company's stock is trading at \$40, then ABC has a dividend yield of 5% while XYZ is only yielding 2.5%. Thus, assuming all other factors are equivalent, an investor looking to supplement his or her income would likely prefer ABC's stock over that of XYZ.

7. Dividend payout ratio

Dividend payout ratio is the fraction of net income a firm pays to its stockholders in dividends:

$$\text{Dividend payout ratio} = \frac{\text{Dividends}}{\text{Net Income for the same period}}$$

The part of the earnings not paid to investors is left for investment to provide for future earnings growth. Investors seeking high current income and limited capital growth prefer companies with high Dividend payout ratio. However investors seeking capital growth may prefer lower payout ratio because capital gains are taxed at a lower rate. High growth firms in early life generally have low or zero payout ratios. As they mature, they tend to return more of the earnings back to investors. Note that dividend payout ratio is calculated as EPS/DPS.

Calculated as:

$$= \frac{\text{Yearly Dividend per share}}{\text{Earning per Share}}$$

or equivalently

$$= \frac{\text{Dividends}}{\text{Net Income}}$$

The payout ratio provides an idea of how well earnings support the dividend payments. More mature companies tend to have a higher payout ratio. In the U.K. there is a similar ratio, which is known as dividend cover. It is calculated as earnings per share divided by dividends per share.

8. Return on Equity

Return on equity (ROE) is a measure of how much, in earnings a company generates in a time period compared to its shareholders' equity. It is typically calculated on a full-year basis (either the last fiscal year or the last four quarters).

Expanded Definition

When capital is tied up in a business, the owners of the capital want to see a good return on that capital. Looking at profit by itself is meaningless. I mean, if a company earns \$1 million in net income, that's okay. But it's great if the capital invested to earn that is only \$2.5 million (40% return) and terrible if the capital invested is \$25 million (4% return).

Return on investment measures how profitable the company is for the owner of the investment. In this case, return on equity measures how profitable the company is for the equity owners, a.k.a. the shareholders.

$$\text{ROE} = \frac{\text{Net Income}}{\text{Average Shareholders Equity}}$$

The "average" is taken over the time period being calculated and is equal to "the sum of the beginning equity balance and the ending equity balance, divided by two."

Return on equity is expressed as a percent and measures the return a company receives on its shareholder's equity. It is a much simpler version of return on invested capital. In general, the market is willing to pay a higher multiple for stocks with higher ROEs.

As with every ratio, ROE should be compared to the company's industry and competitors. If American Eagle Outfitters is earning 35% ROE, that may sound great, but if the industry is earning 40% on average, then the investor should find out why American Eagle is flying lower. Contrariwise, if its competitors are earning 25%, then American Eagle may be a high flyer. However, don't invest based on just one ratio. Compare several ratios before making a decision.

DuPont model

This breaks ROE down into several components so that one can see how changes in one area of the business changes return on equity.

$$\text{ROE} = (\text{net margin}) \times (\text{asset turnover}) \times (\text{equity multiplier})$$

$$\text{ROE} = \frac{\text{net income}}{\text{revenue}} \times \frac{\text{revenue}}{\text{total assets}} \times \frac{\text{total assets}}{\text{equity}}$$

Return on equity grows, all else equal:

- ❖ the more net margin increases,
- ❖ the more revenue is generated from a firm's assets,
- ❖ The more leveraged a firm becomes.

While the first two seem fairly straight forward, the third one doesn't seem to be, but it really is. If revenue-generating assets are purchased through the use of debt (not equity), then the increased amount of net income generated by that greater amount of assets will increase the return on the fixed amount of equity.

Sustainable growth

Return on equity also ties into how much growth one can expect from a company. When a firm reinvests its net income, then it can be expected to grow. The fastest this can be expected to occur is the return on equity. This is calculated:

$$\text{Sustainable growth} = \text{Retention ratio} \times \text{ROE}$$

$$\text{Sustainable growth} = (1 - \text{Payout ratio}) \times \text{ROE}$$

$$\text{Sustainable growth} = \left(1 - \frac{\text{total dividend paid}}{\text{net income}} \right) \times \text{ROE}$$

A more refined definition

Common shareholders are interested in what return the company is making on their stake. To account for this, dividends paid out to preferred shareholders should be subtracted from net income before calculating ROE. So,

$$\text{ROE} = \frac{\text{Net Income} - \text{Preferred Dividends}}{\text{Average Shareholders Equity}}$$

9. Book Value per Share

A measure used by owners of common shares in a firm to determine the level of safety associated with each individual share after all debts are paid accordingly.

$$\text{Book Value Per Share} = \frac{\text{Total shareholder} - \text{Preferred Equity}}{\text{Total Outstanding Shares}}$$

Should the company decide to dissolve, the book value per common indicates the dollar value remaining for common shareholders after all assets are liquidated and all debtors are paid. In simple terms it would be the amount of money that a holder of a common share would get if a company were to liquidate.

Fundamental analysis can be used to identify companies that represent good value. Hence it is good for long term investments. Valuation techniques vary depending on the industry group. For this reason, a different techniques or model is required for different industry. This can get quite time consuming and limit the amount of research that can be performed. In fundamental analysis, companies should be compared against other companies in the same sector. For example, a software company (Infosys Technologies) should be compared with a software company (Wipro), not to a bank (ICICI Bank).

9.1.4.2 Technical Analysis

Technical Analysis is the forecasting of future financial price movements based on an examination of past price movements. Like weather forecasting, technical analysis does not result in absolute predictions about the future. Instead, technical analysis can help investors anticipate what is "likely" to happen to prices over time. Technical analysis uses a wide variety of charts that show price over time.



Technical analysis is applicable to stocks, indices, commodities, futures or any tradable instrument where the price is influenced by the forces of supply and demand. Price refers to any combination of the open, high, low, or close for a given security over a specific time frame. The time frame can be based on intraday (1-minute, 5-minutes, 10-minutes, 15-minutes, 30-minutes or hourly), daily, weekly or monthly price data and last a few hours or many years. In addition, some technical analysts include volume or open interest figures with their study of price action.

The Basis of Technical Analysis

At the turn of the century, the Dow Theory laid the foundations for what was later to become modern technical analysis. Dow Theory was not presented as one complete amalgamation, but rather pieced together from the writings of Charles Dow over several years. Of the many theorems put forth by Dow, three stand out:

- ❖ Price Discounts Everything
- ❖ Price Movements Are Not Totally Random
- ❖ What Is More Important than Why

Price Discounts Everything

This theorem is similar to the strong and semi-strong forms of market efficiency. Technical analysts believe that the current price fully reflects all information. Because all information is already reflected in the price, it represents the fair value, and should form the basis for analysis. After all, the market price reflects the sum knowledge of all participants, including traders, investors, portfolio managers, buy-side analysts, sell-side analysts, market strategist, technical analysts, fundamental analysts and many others. It would be folly to disagree with the price set by such an impressive array of people with impeccable credentials. Technical analysis utilizes the information captured by the price to interpret what the market is saying with the purpose of forming a view on the future.

Prices Movements are not Totally Random

Most technicians agree that prices trend. However, most technicians also acknowledge that there are periods when prices do not trend. If prices were always random, it would be extremely difficult to make money using technical analysis. In his book, *Schwager on Futures: Technical Analysis*, Jack Schwager states:

“One way of viewing it is that markets may witness extended periods of random fluctuation, interspersed with shorter periods of nonrandom behavior. The goal of the chartist is to identify those periods (i.e. major trends).”



A technician believes that it is possible to identify a trend, invest or trade based on the trend and make money as the trend unfolds. Because technical analysis can be applied to many different time frames, it is possible to spot both short-term and long-term trends. The IBM chart illustrates Schwager's view on the nature of the trend. The broad trend is up, but it is also interspersed with trading ranges. In between the trading ranges are smaller uptrends within the larger uptrend. The uptrend is renewed when the stock breaks above the trading range. A downtrend begins when the stock breaks below the low of the previous trading range.

“What” is more important than “Why”

In his book, *The Psychology of Technical Analysis*, Tony Plummer paraphrases Oscar Wilde by stating, “A technical analyst knows the price of everything, but the value of nothing”. Technicians, as technical analysts are called, are only concerned with two things:

1. What is the current price?
2. What is the history of the price movement?

The price is the end result of the battle between the forces of supply and demand for the company's stock. The objective of analysis is to forecast the direction of the future price. By focusing on price and only price, technical analysis represents a direct approach. Fundamentalists are concerned with why the price is what it is. For technicians, the why portion of the equation is too broad and many times the fundamental reasons given are highly suspect. Technicians believe it is best to concentrate on what and never mind why. Why did the price go up? It is simple, more buyers (demand) than sellers (supply). After all, the value of any asset is only what someone is willing to pay for it. Who needs to know why?

General Steps to Technical Evaluation

Many technicians employ a top-down approach that begins with broad-based macro analysis. The larger parts are then broken down to base the final step on a more focused/micro perspective. Such an analysis might involve three steps:

1. Broad market analysis through the major indices such as the S&P 500, Dow Industrials, NASDAQ and NYSE Composite.
2. Sector analysis to identify the strongest and weakest groups within the broader market.
3. Individual stock analysis to identify the strongest and weakest stocks within select groups.

The beauty of technical analysis lies in its versatility. Because the principles of technical analysis are universally applicable, each of the analysis steps above can be performed using the same theoretical background. You don't need an economics degree to analyze a market index chart. You don't need to be a CPA to analyze a stock chart. Charts are charts. It does not matter if the time frame is 2 days or 2 years. It does not matter if it is a stock, market index or commodity. The technical principles of support, resistance, trend, trading range and other aspects can be applied to any chart. While this may sound easy, technical analysis is by no means easy. Success requires serious study, dedication and an open mind.

Chart Analysis

Technical analysis can be as complex or as simple as you want it. The example below represents a simplified version. Since we are interested in buying stocks, the focus will be on spotting bullish situations.



Overall Trend: The first step is to identify the overall trend. This can be accomplished with trend lines, moving averages or peak/trough analysis. As long as the price remains above its uptrend line, selected moving averages or previous lows, the trend will be considered bullish.

Support: Areas of congestion or previous lows below the current price mark support levels. A break below support would be considered bearish.

Resistance: Areas of congestion and previous highs above the current price mark the resistance levels. A break above resistance would be considered bullish.

Momentum: Momentum is usually measured with an oscillator such as MACD. If MACD is above its 9-day EMA (exponential moving average) or positive, then momentum will be considered bullish, or at least improving.

Buying/Selling Pressure: For stocks and indices with volume figures available, an indicator that uses volume is used to measure buying or selling pressure. When Chaikin Money Flow is above zero, buying pressure is dominant. Selling pressure is dominant when it is below zero.

Relative Strength: The price relative is a line formed by dividing the security by a benchmark. For stocks it is usually the price of the stock divided by the S&P 500. The plot of this line over a period of time will tell us if the stock is outperforming (rising) or under-performing (falling) the major index.

The final step is to synthesize the above analysis to ascertain the following:

- ❖ Strength of the current trend.
- ❖ Maturity or stage of current trend.
- ❖ Reward to risk ratio of a new position.
- ❖ Potential entry levels for new long position.

Top-Down Technical Analysis

For each segment (market, sector and stock), an investor would analyze long-term and short-term charts to find those that meet specific criteria. Analysis will first consider the market in general, perhaps the S&P 500. If the broader market were considered to be in bullish mode, analysis would proceed to a selection of sector charts. Those sectors that show the most promise would be singled out for individual stock analysis. Once the sector list is narrowed to 3-4 industry groups, individual stock selection can begin. With a selection of 10-20 stock charts from each industry, a selection of 3-4 of the most promising stocks in each group can be made. How many stocks or industry groups make the final cut will depend on the strictness of the criteria set forth. Under this scenario, we would be left with 9-12 stocks from which to choose. These stocks could even be broken down further to find the 3-4 of the strongest of the strong.

Strengths of Technical Analysis

Focus on Price

If the objective is to predict the future price, then it makes sense to focus on price movements. Price movements usually precede fundamental developments. By focusing on price action, technicians are automatically focusing on the future. The market is thought of as a leading indicator and generally leads the economy by 6 to 9 months. To keep pace with the market, it makes sense to look directly at the price movements. More often than not, change is a subtle beast. Even though the market is prone to sudden knee-jerk reactions, hints usually develop before significant moves. A technician will refer to periods of accumulation as evidence of an impending advance and periods of distribution as evidence of an impending decline.

Supply, Demand, and Price Action

Many technicians use the open, high, low and close when analyzing the price action of a security. There is information to be gleaned from each bit of information. Separately, these will not be able to tell much. However, taken together, the open, high, low and close reflect forces of supply and demand.



The annotated example above shows a stock that opened with a gap up. Before the open, the number of buy orders exceeded the number of sell orders and the price was raised to attract more sellers. Demand was brisk from the start. The intraday high reflects the strength of demand (buyers). The intraday low reflects the availability of supply (sellers). The close represents the final price agreed upon by the buyers and the sellers. In this case, the close is well below the high and much closer to the low. This tells us that even though demand (buyers) was strong during the day, supply (sellers) ultimately prevailed and forced the price back down. Even after this selling pressure, the close remained above the open. By looking at price action over an extended period of time, we can see the battle between supply and demand unfold. In its most basic form, higher prices reflect increased demand and lower prices reflect increased supply.

Support/Resistance

Simple chart analysis can help identify support and resistance levels. These are usually marked by periods of congestion (trading range) where the prices move within a confined range for an extended period, telling us that the forces of supply and demand are deadlocked. When prices move out of the trading range, it signals that either supply or demand has started to get the upper hand. If prices move above the upper band of the trading range, then demand is winning. If prices move below the lower band, then supply is winning.

Pictorial Price History

Even if you are a tried and true fundamental analyst, a price chart can offer plenty of valuable information. The price chart is an easy to read historical account of a security's price movement over a period of time. Charts are much easier to read than a table of numbers. On most stock charts, volume bars are displayed at the bottom. With this historical picture, it is easy to identify the following:

- ❖ Reactions prior to and after important events.
- ❖ Past and present volatility.
- ❖ Historical volume or trading levels.
- ❖ Relative strength of a stock versus the overall market.

Assist with Entry Point

Technical analysis can help with timing a proper entry point. Some analysts use fundamental analysis to decide what to buy and technical analysis to decide when to buy. It is no secret that timing can

play an important role in performance. Technical analysis can help spot demand (support) and supply (resistance) levels as well as breakouts. Simply waiting for a breakout above resistance or buying near support levels can improve returns.

It is also important to know a stock's price history. If a stock you thought was great for the last 2 years has traded flat for those two years, it would appear that Wall Street has a different opinion. If a stock has already advanced significantly, it may be prudent to wait for a pullback. Or, if the stock is trending lower, it might pay to wait for buying interest and a trend reversal.

Weaknesses of Technical Analysis

Analyst Bias

Just as with fundamental analysis, technical analysis is subjective and our personal biases can be reflected in the analysis. It is important to be aware of these biases when analyzing a chart. If the analyst is a perpetual bull, then a bullish bias will overshadow the analysis. On the other hand, if the analyst is a disgruntled eternal bear, then the analysis will probably have a bearish tilt.

Open to Interpretation

Furthering the bias argument is the fact that technical analysis is open to interpretation. Even though there are standards, many times two technicians will look at the same chart and paint two different scenarios or see different patterns. Both will be able to come up with logical support and resistance levels as well as key breaks to justify their position. While this can be frustrating, it should be pointed out that technical analysis is more like an art than a science, somewhat like economics. Is the cup half-empty or half-full? It is in the eye of the beholder.

Too Late

Technical analysis has been criticized for being too late. By the time the trend is identified, a substantial portion of the move has already taken place. After such a large move, the reward to risk ratio is not great. Lateness is a particular criticism of Dow Theory.

Always another Level

Even after a new trend has been identified, there is always another "important" level close at hand. Technicians have been accused of sitting on the fence and never taking an unqualified stance. Even if they are bullish, there is always some indicator or some level that will qualify their opinion.

Trader's Remorse

Not all technical signals and patterns work. When you begin to study technical analysis, you will come across an array of patterns and indicators with rules to match. For instance: A sell signal is given when the neckline of a head and shoulders pattern is broken. Even though this is a rule, it is not steadfast and can be subject to other factors such as volume and momentum. In that same vein, what works for one particular stock may not work for another. A 50-day moving average may work great to identify support and resistance for IBM, but a 70-day moving average may work better for Yahoo. Even though many principles of technical analysis are universal, each security will have its own idiosyncrasies.

Technical analysts consider the market to be 80% psychological and 20% logical. Fundamental analysts consider the market to be 20% psychological and 80% logical. Psychological or logical may be open for debate, but there is no questioning the current price of a security. After all, it is available for all to see and nobody doubts its legitimacy. The price set by the market reflects the sum knowledge of all participants, and we are not dealing with lightweights here. These participants have considered (discounted) everything under the sun and settled on a price to buy or sell. These are the forces of supply and demand at work. By examining price action to determine which force is prevailing, technical analysis focuses directly on the bottom line: What is the price? Where has it been? Where is it going?

Even though there are some universal principles and rules that can be applied, it must be remembered that technical analysis is more an art form than a science. As an art form, it is subject to interpretation.

However, it is also flexible in its approach and each investor should use only that which suits his or her style. Developing a style takes time, effort and dedication, but the rewards can be significant.

9.2 MARKET INDICATORS, SUPPORT AND RESISTANCE LEVEL, PATTERNS IN STOCK PRICE

9.2.1 Market indicators - to forecast predictive value for technical analysis

Market indicators are a series of technical indicators used by traders to predict the direction of the major financial indexes. Most market indicators are created by analyzing the number of companies that have reached new highs relative to the number that created new lows, also known as market breadth.

(A) Breadth Index:

Breadth Index covers all securities traded and also the volume of transactions to give a view of the direction of the stock market movements. It is an addition to the Dow Theory and the movement of the Dow Jones Averages.

(i) **Measurement:** It is computed by dividing the Net Advances or declines in the market by the number of issues traded.

(ii) Application and Inference:

- ❖ The breadth index can either support or contradict the movement of the Dow Jones Averages.
- ❖ If it supports the movement of the Dow Jones Averages, this is considered sign of technical strength and if it does not support the averages, it is a sign of technical weakness i.e. a sign that the market will move in a direction opposite to the Dow Jones Averages.

(B) Volume of Transactions:

Volume represents quantities purchased and also the number of transactions entered into in the market in a given period. These provide useful clues on how the market would behave in the near future.

Application/Inference:

Price	Volume	Signal/Inference
Rising	Increasing	"Buy Behaviour Reflects an unsatisfied demand in the market"
Falling	Increasing	Bear Market – "Sell Behaviour" The prices would be expected to fall further
Rising	Decreasing	Bull Market
Falling	Decreasing	Bear Market

(C) Confidence Index:

(i) **Meaning:** Confidence Index indicates the willingness of the investors to take a chance in the market. It is the ratio of High-grade bond yields to low-grade bond yields.

(ii) **Application:** Market analysts use confidence index as a method of trading or timing the purchase and sale of stock. They are also used as a forecasting device to determine the turning points of the market.

(iii) Inference:

- ❖ Rising confidence index is expected to precede a rising stock market, and a fall in the index is expected to precede a drop in stock prices.

- ❖ A fall in the confidence index represents the fact that Low-Grade Bond yields are rising faster or falling more slowly than high grade yields.

(iv) **Limitations:** Confidence index is not always a leading indicator of the market. Hence, it should be used in conjunction with other market indicators.

(D) Relative Strength Analysis:

(i) **Relatively Strong Securities:** Securities with historically high average returns as compared to other securities, are securities with high relative strength.

(ii) **Theory:**

- ❖ Some securities are stronger than the other securities, due to which they rise relatively faster in the bull market or decline more slowly in a bear market, than the others.
- ❖ Investors can earn higher returns by investing in such securities because the relative strength of a security tends to remain undiminished over time.

(iii) **Measurement:** Relative strength can be measured in several ways. Ratios like security relative to its industry and security relative to the entire market can also be used to detect relative strength in a security or an industry.

(E) Odd-Lot Theory:

- (i) This theory is a contrary-opinion theory. It assumes that the average person is usually wrong and that a wise course of action is to pursue strategies contrary to popular opinion.
- (ii) **Application:** The odd-lot theory is used primarily to predict tops in bull markets, but also to predict reversals in individual securities.

9.2.2 Support Levels and Resistance Levels

The concepts of support and resistance are undoubtedly two of the most highly discussed attributes of technical analysis and they are often regarded as a subject that is complex by those who are just learning to trade. Support and resistance represent key junctures where the forces of supply and demand meet. In the financial markets, prices are driven by excessive supply (down) and demand (up). Supply is synonymous with bearish, bears and selling. Demand is synonymous with bullish, bulls and buying. As demand increases, prices advance and as supply increases, prices decline. When supply and demand are equal, prices move sideways as bulls and bears slug it out for control.

Support Levels: When the Index / Price rebounds after reaching a trough subsequently, the lowest value reached becomes the support level. A support level is a price level where the price tends to find support as it is going down. This means the price is more likely to “bounce” off this level rather than break through it. However, once the price has passed this level, by an amount exceeding some noise, it is likely to continue dropping until it finds another support level.

Resistance Levels: Represents the peak value from which the index or price goes down. A resistance level is the opposite of a support level. It is where the price tends to find resistance as it is going up. This means the price is more likely to “bounce” off this level rather than break through it. However, once the price has passed this level, by an amount exceeding some noise, it is likely that it will continue rising until it finds another resistance level.

Identifying Support and Resistance Levels

Support and resistance levels can be identified by trend lines (technical analysis). Some traders believe in using pivot point calculations. The more often a support/resistance level is “tested” (touched and bounced off by price), the more significance given to that specific level. If a price breaks past a support level, that support level often becomes a new resistance level. The opposite is true as well, if price breaks a resistance level, it will often find support at that level in the future. The development of support and resistance levels is probably the most noticeable and reoccurring event on price charts.

The breaking through support/resistance levels can be triggered by fundamental changes that are above or below investor's expectations (e.g., changes in earnings, management, competition, etc.) or by self-fulfilling prophecy (investors buy as they see prices rise). The cause is not so significant as the effect: new expectations lead to new price levels. There are support/resistance levels, which are more emotional. Support levels are usually below the current price, but it is not uncommon for a security to trade at or near support. Technical analysis is not an exact science and it is sometimes difficult to set exact support levels. In addition, price movements can be volatile and dip below support briefly. Sometimes it does not seem logical to consider a support level broken if the price closes 1/8 below the established support level. For this reason, some traders and investors establish support zones. Resistance levels are usually above the current price, but it is not uncommon for a security to trade at or near resistance. In addition, price movements can be volatile and rise above resistance briefly. Sometimes it does not seem logical to consider a resistance level broken if the price closes 1/8 above the established resistance level. For this reason, some traders and investors establish resistance zones.

Support turns resistance and vice-versa

Another principle of technical analysis stipulates that support can turn into resistance and vice versa. Once the price breaks below a support level, the broken support level can turn into resistance. The break of support signals that the forces of supply have overcome the forces of demand. Therefore, if the price returns to this level, there is likely to be an increase in supply, and hence resistance. The other turn of the coin is resistance turning into support. As the price advances above resistance, it signals changes in supply and demand. The breakout above resistance proves that the forces of demand have overwhelmed the forces of supply. If the price returns to this level, there is likely to be an increase in demand and support will be found.

Applications and Market Behavior:

(a) Price Band: Price is expected to move between these two levels.

(b) Market Behavior:

- ❖ If the price approaches the resistance level, there is a selling pressure because all investors who failed to sell at the high would be keen to liquidate
- ❖ Whenever the price approaches the support level, there is a buying pressure as all those investors who failed to buy at the lowest price would like to purchase the share.

(c) Prices outside the Support Level and Resistance Level: Breach of these levels indicates a distinct departure from status quo, and an attempt to set newer levels.

The following principles are to be applied while using support and resistance lines for trend analysis:

- (i) Support and resistance lines are only approximations of the levels, prices may be expected to 'obey'. They should, therefore, be drawn using judgment, and clues from the past price behavior.
- (ii) Penetration of a support or resistance line, also confirmed by an underlying price pattern, is a fairly sure indication of a strong ensuing move in the same direction. New highs are reached after a resistance line is penetrated and new lows follow penetration of a support line.
- (iii) Prices are said to remain in a 'congestion zone' as long as they fluctuate in narrow ranges within a support and resistance level. The direction of breakout from a congestion zone cannot be predicted in advance.
- (iv) The higher the volume accompanying the confirmation of a support or resistance level, the more its significance.
- (v) The speed and extent of the previous move determines the significance of a support or resistance level. Prices penetrate support (resistance) level generally after slowing down from a previous low (high) and hovering around a level for sometime.

- (vi) Support and resistance levels repeat their effectiveness time and again, even if separated by many years.

Identification of key support and resistance levels is an essential ingredient to successful technical analysis. Even though it is sometimes difficult to establish exact support and resistance levels, being aware of their existence and location can greatly enhance analysis and forecasting abilities. If a security is approaching an important support level, it can serve as an alert to be extra vigilant in looking for signs of increased buying pressure and a potential reversal. If a security is approaching a resistance level, it can act as an alert to look for signs of increased selling pressure and potential reversal. If a support or resistance level is broken, it signals that the relationship between supply and demand has changed. A resistance breakout signals that demand (bulls) has gained the upper hand and a support break signals that supply (bears) has won the battle.

9.2.3 Patterns in Stock Price

In the Stock Market, the index / stock price represents certain patterns over various periods of time:

(i) Channel:

- (a) A series of uniformly changing tops (Peak Prices) and bottoms (Lowest Prices) rise to a channel formation.
- (b) A downward sloping channel would indicate declining prices and an upward sloping channel would imply rising prices.

- (ii) Wedge:** Wedge is formed when the tops (Resistance Levels / Peaks) and bottoms (Support Levels) change in opposite direction (that is, if the tops, are decreasing then the bottoms are increasing and vice versa), or when they are changing in the same direction at different rates over time.



(iii) Head and Shoulders:

- (a) **Meaning:** It is a price pattern which resembles a distorted drawing of a human form, with a large lump (for head) in the middle of two smaller humps (for shoulders).

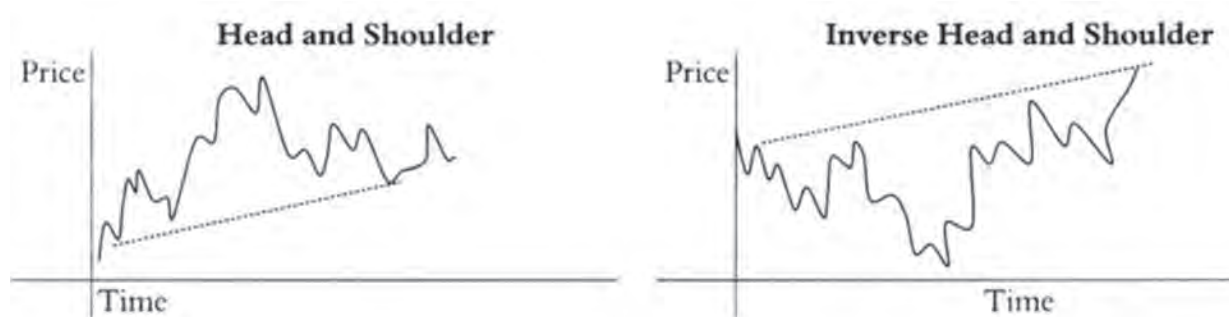
(b) Significance and Inference:

- This is the most important pattern to indicate a reversal of price trend.
- The neckline of the pattern is formed by joining points where the head and the shoulders meet. The price movement after the formation of the second shoulder signifies the direction of price movement.
- If the price goes below the neckline, then a drop in price is indicated, with the drop expected to be equal to the distance between the top of the head and the neckline.

(c) Diagrammatic Representation:

- **Head and Shoulder Top Pattern:** This formation represents bearish development, and if the price falls below the neck line (line drawn tangentially to the left and right shoulders) a price decline is expected. It is a signal to sell.

- **Inverse Head and Shoulder Pattern:** It reflects a bullish development. The price rise to above the neck line suggests price rise is imminent and a signal to purchase.



- (iv) **Triangle or Coil Formation:** This formation represents a pattern of uncertainty and is difficult to predict which way the price will break out.
- (v) **Flags & Pennants Form:** This form signifies a phase after which the previous price trend is likely to continue.
- (vi) **Double Top and Bottom:**
 - (a) Double top form represents a bearish development, signaling that prices are expected to fall.
 - (b) Double bottom form represents a bullish development signaling an increase in price.
- (vii) **Gap:**
 - (a) **Meaning:** Gap is the difference between the opening price on a trading day and the closing price of the previous trading day.
 - (b) **Inferences:** Wider the gap the stronger the signal for a continuation of the observed trend. On a rising market, if the opening price is considerably higher than the previous closing price, it indicates that investors are willing to pay a much higher price to acquire the scrip. Similarly, a gap in a falling market is an indicator of extreme selling pressure.

9.3 STATISTIC MODELS, BOLLINGER BANDS

9.3.1 Statistic Models

- A. Moving Averages:** Moving averages are frequently plotted with prices to make buy and sell decisions. The two types of moving averages used by chartists are —
 - (a) **Arithmetical Moving Average (AMA):** An N-period Arithmetic Moving Average, at period t, is the simple average of the last N period prices including the price at period t. Under AMA, each period's values is given equal weights.
 - (b) **Exponential Moving Average:**

Exponential Moving Average assigns a smaller weight, to the observation at time t and a large weight to the Exponential Moving Average of the previous period. The weight for every observation decreases exponentially, according to a scheme specified by the exponential smoothing constant, also known as the exponent, α .

$$\text{EMA at } t = S_t = \alpha \times P_t + (1 - \alpha) \times S_{t-1}$$

Where, S_t is the Exponential Moving Average at time t.

P_t is the Index Value as at time t.

α is the Value of the Exponent = $2 / (1 + \text{No. of Observations})$

B. Buy and Sell Signals Provided by Moving Average Analysis

(a) Buy Signal: The stock price line

- Rises through the moving average line. Moving Average Line is flattening.
- Falls below moving average line which is rising.
- Which is above moving average line falls but begins to rise again before reaching the moving average line.

(b) Sell Signal: The stock price line —

- Falls through moving average line when graph of the moving average line is flattening out.
- Rises above moving average line which is falling.
- Which is below moving average line rises but begins to fall again before reaching the moving average line.

However, there are other advanced technical tools too. Some of them are named as:

- The Confidence Index
- Contrary Opinion Theories
 - ✓ Odd-Lot Theory
 - ✓ Mutual Fund Liquidity
- Oscillators
- Stochastics
- Elliott Wave Theory

9.3.2 Bollinger Bands

Bollinger Bands represents the space between two lines drawn on either side of the simple moving average. It consists of a centreline and two price channels, one above the centreline and one below. The centreline is an Exponential Moving Average, and the price channels are standard deviations of the stock the chartist is studying. The bands will expand and contract as the price action of an issue becomes volatile (expansion) or becomes bound into a tight trading pattern (contraction). Because standard deviation is a measure of volatility, Bollinger Bands adjust themselves to the market conditions. When the markets become more volatile, the bands widen (move further away from the average), and during less volatile periods, the bands contract (move closer to the average). The tightening of the bands is often used by technical traders as an early indication that the volatility is about to increase sharply.

This is one of the most popular technical analysis techniques. The closer the prices move to the upper band, the more overbought the market, and the closer the prices move to the lower band, the more oversold the market.

The purpose of Bollinger Bands is to provide a relative definition of high and low. By definition, prices are high at the upper band and low at the lower band. This definition can aid in rigorous pattern recognition and is useful in comparing price action to the action of indicators to arrive at systematic trading decisions.

Computation of Factors:

The Bollinger band formula consists of the following —

Upper Band = Moving Average (TP, n) + m X Standard Deviation (TP, n)

Lower Band = Moving Average (TP, n) – m X Standard Deviation (TP, n)

Where, n = Smoothing Period

m = Number of Standard Deviations (SD)

Standard Deviation is for the last “n” periods

TP = Typical Price = (High + Low + Closing) / 3

Features:

- (a) They adapt dynamically to price expanding and contracting as volatility increases and decreases. Therefore, the bands naturally widen and narrow in sync with price action, creating a very accurate trending envelope.
- (b) The technician can be relatively certain that almost all of the price data needed will be found between the two bands.
- (c) A band is plotted two standard deviations away from a simple moving average. Because standard deviation is a measure of volatility, Bollinger bands adjust themselves to the market conditions.
- (d) When the markets become more volatile, the bands widen (move further away from the average), and during less volatile periods, the bands contract (move closer to the average).

Market Application:

- (a) Indication of Volatility:** Tightening of the bands is often used by technical traders as an early indication that the volatility is about to increase sharply.
- (b) Interference of Prices around the Band:** The closer the prices move to the upper band, the more overbought (purchase position more than sale position) the market, and the closer the prices move to the lower band, the more oversold (sale position more than the purchase position) the market.
- (c) Larger Trend:** Bollinger's Band helps in identifying the larger trend, since in the short run every price movement is volatile. Bollinger's Band presents a price channel, which are designed to encompass the trading activity around the trend.
- (d) Action Based on Bollinger Band:** Traders use them primarily to determine overbought and oversold levels, selling when price touches the upper Bollinger Band and buying when it hits the lower Bollinger band.

9.4 PORTFOLIO MANAGEMENT

A portfolio refers to a collection of investment tools such as stocks, shares, mutual funds, bonds, cash and so on depending on the investor's income, budget and convenient time frame.

Portfolio Management refers to the selection of securities and their continuous shifting in the Portfolio for optimizing the return and maximizing the wealth of an investor.

A Portfolio Management refers to the science of analyzing the strengths, weaknesses, opportunities and threats for performing wide range of activities related to the one's portfolio for maximizing the return at a given risk. It helps in making selection of debt vs. equity, growth vs. safety, and various other tradeoffs.

So we can say that Portfolio Management is the art of selecting the right investment policy for the individuals in terms of minimum risk and maximum return is called as portfolio management.

Portfolio management refers to managing an individual's investments in the form of bonds, shares, cash, mutual funds etc. so that he earns the maximum profits within the stipulated time frame.

9.4.1 Types of Portfolio Management

Portfolio Management is further of the following types:

- **Active Portfolio Management:** As the name suggests, in an active portfolio management service, the portfolio managers are actively involved in buying and selling of securities to ensure maximum profits to individuals.
- **Passive Portfolio Management:** In a passive portfolio management, the portfolio manager deals with a fixed portfolio designed to match the current market scenario.
- **Discretionary Portfolio management services:** In Discretionary portfolio management services, an individual authorizes a portfolio manager to take care of his financial needs on his behalf. The individual issues money to the portfolio manager who in turn takes care of all his investment needs, paper work, documentation, filing and so on. In discretionary portfolio management, the portfolio manager has full rights to take decisions on his client's behalf.
- **Non-Discretionary Portfolio management services:** In non discretionary portfolio management services, the portfolio manager can merely advise the client what is good and bad for him but the client reserves full right to take his own decisions.

Major tasks involved with Portfolio Management are as follows.

- Taking decisions about investment mix and policy
- Matching investments to objectives
- Asset allocation for individuals and institution
- Balancing risk against performance

9.4.2 Objectives of Portfolio Management

The objectives of Portfolio management are —

- (i) Reduce Risk:** To reduce the risk of loss of capital / income, by investing in various types of securities and over a wide range of industries, i.e. diversification.
- (ii) Safety of Principal:** To keep the capital / principal amount intact, in terms of value and in terms of purchasing power. The capital or the principal amount invested should not erode, either in value or in terms of purchasing power. By earning return, principal amount will not erode in nominal terms, by earning returns at a rate not lesser than the inflation rate; principal amount will be intact in present value terms.
- (iii) Stability of Income:** To facilitate a more accurate and systematic re-investment of income, to ensure growth and stability in returns.
- (iv) Capital Growth:** To enable attainment of capital growth by reinvesting in growth securities or through purchase of growth securities.
- (v) Marketability:** To have an easily marketable investment portfolio, so that the investor is able to take advantage of attractive opportunities in the market.
- (vi) Liquidity:** Some investors prefer that the portfolio should be such that whenever they need their money, they may get the same.
- (vii) Maintaining the Purchasing Power:** Inflation eats the value of money, i.e., purchasing power.



Hence, one object of the portfolio is that it must ensure maintaining the purchasing power of the investor intact besides providing the return.

(viii) Tax Savings: To effectively plan for and reduce the tax burden on income, so that the investor gets maximum from his investment.

9.4.3 Basic Principles of Portfolio Management

There are two basic principles of Portfolio Management, viz.

A. Effective Investment Planning: Effective investment planning is made by taking into account —

- (i) Fiscal, financial and monetary policies of the Government, and the Reserve Bank of India.
- (ii) Industrial and economic environment and its impact on industry prospects in terms of prospective technological changes, competition in the market, capacity utilization by the industry and demand prospects, etc.

B. Constant Review of investment: The Portfolio Manager should review the investment in securities on a continuous basis, to identify more profitable avenues for selling and purchasing the investment. This review requires analysis of the following —

- (i) Assessment of quality of management of the Companies in which investment has already been made or is proposed to be made.
- (ii) Financial and trend analysis of Companies' Financial Statements, to identify sound Companies with optimum capital structure and better performance and to disinvest the holding of those Companies whose performance is not satisfactory.
- (iii) Analysis of securities Market and its trend.

The above analysis will help the portfolio manager to arrive at a conclusion as to whether the securities already in possession should be disinvested and new securities be purchased. If, so the timing for investment or dis-investment is also revealed.

9.4.4 Factors Affecting Investment Decisions in Portfolio Management

Selection of Investment is based on the following criteria—

- (i) **Types of Securities:** What type of securities should be chosen? Debentures, Convertible Bonds, Preference Shares, Equity Shares, Government Securities and Bonds etc.
- (ii) **Proportion of Investment:** What should be the proportion of investment in Fixed Interest/ Dividend Securities and variable interest/dividends bearing securities?
- (iii) **Identification of Industry:** In case investments are to be made in the Shares or Debentures of Companies, which particular industry shows potential of growth?
- (iv) **Identification of Company:** After identifying industries with high growth potential, selection of the Company, in whose shares or securities investments are to be made.
- (v) **Objectives of Portfolio:** If the portfolio is to have a safe and steady returns (such as Provident Funds and welfare funds), then securities with low-risk would be selected. In case of portfolios which are floated for high returns, then risk investments which carry a very high rate of return will be selected.
- (vi) **Timing of purchase:**
 - At what price the share is acquired for the Portfolio, depends entirely on the timing decision.
 - If a person wishes to make any gains, he should buy when the shares are selling at a low price and sell when they are at a high price.
- (vii) **Risk Tolerance:** Risk refers to the volatility of portfolio's value. The amount of risk the investor is willing to take on is an extremely important factor. While some people do become more risk averse as

they get older; a conservative investor remains risk averse over his life-cycle. An aggressive investor generally dares to take risk throughout his life. If an investor is risk averse and he takes too much risk, he usually panics when confronted with unexpected losses and abandons their investment plans mid-stream and suffers huge losses.

9.4.5 Discretionary and Non-Discretionary Portfolio Manager

A portfolio manager is a body corporate who, pursuant to a contract or arrangement with a client, advises or directs or undertakes on behalf of the client (whether as a discretionary portfolio manager or otherwise), the management or administration of a portfolio of securities or the funds of the client.

The discretionary portfolio manager individually and independently manages the funds of each client in accordance with the needs of the client.

The non-discretionary portfolio manager manages the funds in accordance with the directions of the client.

A. Discretionary Portfolio Manager:

- (i) **Complete Autonomy:** Discretionary Portfolio Manager exercises a full degree of discretion, in respect of the investments or management of the portfolio of securities or the funds of the client.
- (ii) **Client Based Approach:** He shall individually and independently manage the funds of each client in accordance with the needs of the client, in a manner which does not resemble a Mutual Fund.

B. Non-discretionary Portfolio Manager:

- (i) **Directed by Client:** Non-Discretionary Portfolio Manager manages the funds in accordance with the directions of the client.
- (ii) **Advisory Role:** Instead of making changes to the Portfolio at their own discretion, the Portfolio Managers refer relevant advice and information to the client, who then makes the actual investment decision.

9.5 THEORIES ON STOCK MARKET MOVEMENTS

With the development in the liberalization of capital movements and the securitization of stock markets, international financial markets have become increasingly interdependent. Advanced computer technology and improved worldwide network processing of news have improved the possibilities for domestic stock markets to react promptly to new information from international markets. As a consequence, an increasing attention has been given in recent literature to the topic of international transmission of stock market returns and volatility.

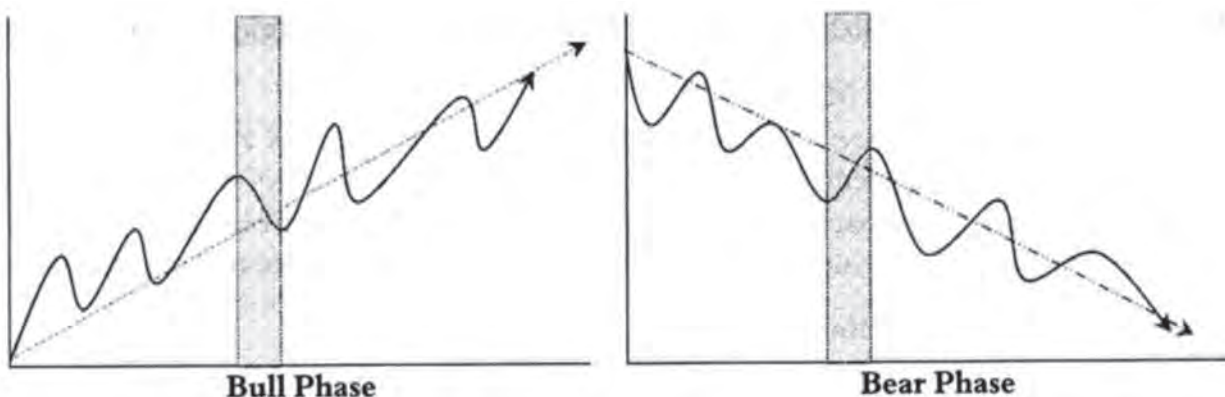
9.5.1 Dow-Jones Theory Regarding the Behaviour of Stock Market Prices

The Dow theory is one of the oldest and most famous technical tools. It was originated by Charles Dow, who founded the Dow Jones Company and was the editor of The Wall Street Journal, Mr. Dow died in 1902. The Dow theory was developed by W.P. Hamilton and Robert Rhea from the editorial written by Dow during 1900-1929 years, numerous writers have altered, extended and in some cases abridged the original Dow theory. It is the basis for many other techniques used by technical analysts.

The Dow theory is credited with having forecast the Great Crash of 1929. According to Dow, "The market is always considered as having three movements, all going at the same time. The first is the narrow movement from day to day. The second is the short swing running from two weeks to a month or more, the third is the main movement covering at least four years in duration."

(A) Movements in Share Prices: Movements in the share prices on the share market can be classified into the following three major categories —

- (i) **Primary Trends:** The primary trend is the long range cycle that carries the entire market up or down (bull or bear markets).
- **Feature:** Primary movements indicate the basic trend in the market. However, in the short-run, some reverse trend may also be observed, but in the long-run they will end up either with a rise or fall in prices.
 - **Period:** Primary movements reflect the trend of the share market, and may continue from one to three years or even more.
 - **Example:** Bull Phase is one in which the succeeding highs exceed the preceding highs, and the successive lows are higher than the preceding lows. The reverse is the case in bear phase. Correct determination of such movements is the major objective of Dow-Jones theorists.
- (ii) **Secondary Movements (trends):** The secondary trend acts as a restraining force on the primary trend. It tends to correct deviations from its general boundaries.
- **Feature:** Intervening movements in prices which last for a short period running counter to the primary trend, i.e. in case of Bull Phase in Primary Movement, after a rise in prices, there will be a fall in the prices. This fall in prices is referred to as Secondary Movement.
 - **Time:** Secondary Movements are shorter in duration, ranging in a few weeks, and the extent of secondary movement (upward or downward) ranges from 33% to 66% of the primary movement. Example: In a Bull Run (Primary Movement), for a rise of 30% in the market capitalization, there will be a fall of 20% (Maximum) in Market Capitalisation.
- (iii) **Daily Fluctuations (minor trends):** The minor trends have little analytical value, because of their short durations and variations in amplitude.
- **Feature:** These are everyday's irregular fluctuations in share prices in either direction, as a result of activities of speculators.
 - **Importance:** Such fluctuations have no bearing for an investor, and hence his investment or divestment decisions, should not be guided by such fluctuations.



Note:

- Dotted lines represent primary movement in the stock prices.
- Movement in the shaded region represents "Secondary Movement". Under the Bull Phase (Primary Movement), there is a downward movement for a short span of time. Under the Bear Phase (Primary Movement), there is an upward movement, which is succeeded by a dip.

- (B) Dow-Jones Averages:** The Dow-Jones Theory is based upon the movement of two indices -constructed by Charles Dow, Dow Jones Industrial Average and Dow Jones Transportation Average. These averages reflect the aggregate impact of all kinds of information on the market.
- (C) Benefits of Dow-Jones theory:**
- (a)** Timing of Investment: Investor can choose the appropriate time for his investment / divestment. Investment should be made in shares when their prices have reached the lowest level, and sell them at a time when they reached the highest peak.
 - (b)** Identification of Trend: Using Dow-Jones theory, the correct and appropriate movement in the Market Prices can be identified, and depending on the investors' preference, decisions can be taken.
- (D) Criticism of the Theory:**
- (a)** It is not a theory but an interpretation of known data. A theory should be able to explain why a phenomenon occurs. No attempt was made by Dow or his followers to explain why the two averages should be able to forecast future stock prices.
 - (b)** It is not acceptable in its forecast. There was considerable lag between the actual turning points and those indicated by the forecast.
 - (c)** It has poor predictive power. According to Rosenberg, the Dow Theory could not forecast the bull market which had preceded the 1929 crash. It gave bearish indication in early 1926. The 31/2 years which followed the forecast of Hamilton's editorials for the 26-years period, from 1904 to 1929. Of the 90 recommendations Hamilton made for a change in attitude towards the market (55% were bullish, 18% bearish and 29% doubtful) only 45 were correct. Such a result an investor may get by flipping a coin)

9.5.2 Markowitz Model of Risk-Return Optimization

- A. Propounded By:** Harry Markowitz, regarded as the father of modern portfolio theory, has propounded the Markowitz Model of Risk Return optimization.
- B. Basis:**
- (i)** Investors are mainly concerned with two properties of an asset — Risk and Return.
 - (ii)** Investor can trade off between return and risk, by diversification of portfolio. To the investor, risk of an individual asset does not matter. What really matters is the contribution it makes to the investor's total risk. The tradeoff between risks and returns which must be reflected in the required rates of returns on investment opportunities.
 - (iii)** The theory focuses on balancing safety, liquidity and return depending on the taste of different investors.
- C. Application:** The model is used to address the following portfolio selection problems / questions —
- (i)** Finding the mean variance efficient portfolios and
 - (ii)** Selecting one such portfolio.
- D. Assumptions of the Model:** The model has taken into account of risks associated with investments of risks associated with investments – using variance or standard deviation of the return. The model is based on the following assumptions —
- (i)** Return on an investment adequately summarises the outcome of the investment.
 - (ii)** Investors can visualise a probability distribution of rates of return.
 - (iii)** Investors' risk estimates are proportional to the variance of return they perceive for a security or portfolio.

- (iv) Investors base their investment decisions on two criteria i.e. expected return and variance of return (Risk).
- (v) Investors are risk averse. For a given expected return he prefers to take minimum risk, for a given level of risk the investor prefers to get maximum expected return.
- (vi) Investors are assumed to be rational in so far as they would prefer greater returns to lesser ones given equal or smaller risk and risk averse. Risk aversion in this context means merely that as between two investments with equal expected returns, the investment with the smaller risk would be preferred.
- (vii) 'Return' could be any suitable measure of monetary inflows such as NPV, but yield has been the most commonly used measure of return, in this context, so that where the standard deviation of returns is referred to we shall mean the standard deviation of yield about its expected value.

E. Diversification and Efficient Portfolio:

- (i) Efficient Frontier: Markowitz developed the concept of efficient frontier. For selection of a portfolio, comparison between combinations of portfolios is essential. A portfolio is not efficient if there is another portfolio with —
 - Higher expected value of return and a lower standard deviation (risk).
 - Higher expected value of return and the same standard deviation (risk)
 - Same expected value but a lower standard deviation (risk)
- (ii) Optimum Portfolio: Investor has to select a portfolio from amongst all those represented by the efficient frontier. This will depend upon his risk-return preference. As different investors have different preferences with respect to expected return and risk, the optimal portfolio of securities will vary considerably among investors.
- (iii) Diversification: Diversification is the process which combines assets that are less than perfectly positively correlated in order to reduce portfolio risk without sacrificing any portfolio returns. If an investors' portfolio is not efficient he may —
 - Increase the expected value of return without increasing the risk.
 - Decrease the risk without decreasing the expected value of return, or
 - Obtain some combination of increase of expected return and decrease risk.

9.6 RISK ANALYSIS

9.6.1 Type of Risks

A. Systematic Risk: It arises out of external and uncontrollable factors, which are not specific to a security or industry to which such security belongs. It is that part of risk caused by factors that affect the price of all the securities. Systematic Risk cannot be eliminated by diversification.

(i) Market Risk:

- These are risks that are triggered due to social, political and economic events. Example: When CBDT issued a draft circular on how to treat income from trading in shares, whether as Capital Receipts or Business Receipts, the stock prices fell down sharply, across all sectors.
- These risks arises due to changes in demand and supply, expectations of the investors, information flow, investor's risk perception, etc. consequent to the social, political or economic events.

(ii) Interest Rate Risk:

- Uncertainty of future market values and extent of income in the future, due to fluctuations in the general level of interest, is known as Interest Rate Risk.
- These are risks arising due to fluctuating rates of interest and cost of corporate debt. The cost of corporate debt depends on the interest rates prevailing, maturity periods, credit worthiness of the borrowers, monetary and credit policy of RBI, etc.

(iii) Purchasing Power Risk: Purchasing Power Risk is the erosion in the value of money due to the effects of inflation.

B. Unsystematic Risk: These are risks that emanate from known and controllable factors, which are unique and / or related to a particular security or industry. These risks can be eliminated by diversification of portfolio.

(i) Business Risk:

- It is the volatility in revenues and profits of particular Company due to its market conditions, product mix, competition, etc.
- It may arise due to external reasons or (Government policies specific to that kind of industry) internal reasons (labour efficiency, management, etc.)

(ii) Financial Risk (RTP):

- These are risks that are associated with the Capital Structure of a Company. A Company with no Debt Financing, has no financial risk. Higher the Financial Leverage, higher the Financial Risk.
- These may also arise due to short term liquidity problems, shortage in working capital due to funds tied in working capital and receivables, etc.

(iii) Default Risk: These arise due to default in meeting the financial obligations on time. Non-payment of financial dues on time increases the insolvency and bankruptcy costs.

C. Risk Involved In Investment in Government Securities [G.Sec.]:

Interest Rate Risk:

- (i)** Interest Rate Risk are on account of inverse relation of price and interest. These are typical of any fixed coupon security with a fixed period to maturity.
- (ii)** However, this risk can be completely eliminated in case an investor's investment horizon (intended period of holding) identically matches the term of security.

Re-investment Risk:

- (i)** Re—investment risk is the risk that the rate at which the interim cash flows are re-invested may fall thereby affecting the returns.
- (ii)** The most prevalent tool deployed to measure returns over a period of time is the yield-to-maturity (YTM) method which assumes that the cash flows generated during the life of a security is reinvested at the rate of YTM.

Default Risk:

- (i)** Default risk in the context of a Government Security is always zero.
- (ii)** However, these securities suffer from a small variant of default risk, i.e. maturity risk.
- (iii)** Maturity Risk is the risk associated with the likelihood of Government issuing a new security in place of redeeming the existing security. In case of Corporate Securities, it is referred to as Credit Risk.

Types of Risk involved in Investment in Government Securities:

- Government Securities are usually referred to as risk free securities. However, these securities are subject to only one type of risk, i.e. interest rate risk.
- Subject to changes in the overall interest rate scenario, the price of these securities may appreciate or depreciate.

9.6.2 Components of Risk

Total Risk = Systematic Risk + Unsystematic Risk

- **Systematic Risk:** It represents that portion of Total Risk which is attributable to factors that affect the market as a whole. Beta is a measure of Systematic Risk.
- **Unsystematic Risk:** It is the residual risk or balancing figure, i.e. Total Risk Less Systematic Risk.

9.6.3 Measure of Risk:

Circumstances: An investor will look at the Yarn nee or Standard deviation of an individual security as a proper measure of risk in the following circumstances —

- (i) His portfolio consists of only one security.
- (ii) Investor who is evaluating the diversifiable risk, i.e. a rational risk-averse investor who wants to bring down the risk associated with his portfolio.

Inefficient Investor: Such an investor does not consider or evaluate the non-diversifiable risk at all for his decision-making. Such an investor can also be termed as an inefficient investor.

No Return for Diversifiable Risk: While risk is analysed into diversifiable and non-diversifiable segments, the market generally does not reward for diversifiable risk, since the investor himself is expected to diversify the risk himself.

9.6.4 Statistical Tools, Standard Deviation & Variance

A. Statistical Tools: Statistical tools such as measures of dispersion can be used to evaluate the risk associated with returns from a project or investment. Measures of dispersion include Variance and Standard Deviation.

B. Standard Deviation as a Measure of Risk:

- ❖ The Standard Deviation is a measure of how each possible outcome deviates from the Expected Value. The higher the value of dispersion (i.e. Standard Deviation), the higher is the risk associated with the Portfolio and vice-versa.
- ❖ Generally, Standard Deviation of a specified security or portfolio is considered to be the Total Risk associated with that security or portfolio.
- ❖ Standard Deviation is the average or mean of deviations. Deviations are the movement in returns from the mean return. It measures the risk in absolute terms.
- ❖ Standard Deviation is generally considered as the Total Risk of a particular security.

Mathematical Notation:

a. When Standard Deviation is taken as Total Risk

$$\sigma_s = \sigma_s \times \rho_{SM} + \sigma_s \times (1 - \rho_{SM})$$

$$(or) \underbrace{\beta_{SM} \times \sigma_M}_{\text{Systematic Risk}} + \underbrace{\sigma_s \times (1 - \rho_{SM})}_{\text{Unsystematic Risk}}$$

Systematic Risk + Unsystematic Risk Where

Where σ_s = Standard Deviation of the Returns from Security S

ρ_{SM} = Correlation Co-efficient between Returns from Security S and Market Portfolio

β_{SM} = Beta of Security S with reference to Market Returns

C. Variance as a Measure of Risk: Variance measures is the sum of square of deviations from the mean.

Mathematical Notation:

When Variance is taken as Total Risk

$$\sigma_s^2 = \underbrace{\beta_s^2 \times \sigma_M^2}_{\text{Systematic Risk}} + \underbrace{\sigma_s^2 \times (1 - \rho_{SM}^2)}_{\text{Unsystematic Risk}}$$

Systematic Risk + Unsystematic Risk

Where σ_s^2 = Variance of the Returns from Security S

ρ_{SM}^2 = Square of Correlation Co-efficient between Returns from Security S and Market
(Co-efficient of Determination)

Note: Unsystematic Risk is computed only as the balancing figure, and not as a separate item.

9.6.5 Beta Measures Non-Diversifiable Risk

Type of Investor: For an investor who invests his money in a portfolio of securities, Beta is the proper measure of risk.

Non-Diversifiable Risk: Only a portfolio investor would look into eliminating the diversifiable risk and evaluate the exact extent of systematic or non-diversifiable risk .

Concept of Beta:

- (i) Measure of Sensitivity: Beta of a security measures the sensitivity of the security with reference to a broad based market index like BSE Sensex, NIFTY.
- (ii) Measure of Systematic Risk: Beta measures systematic risk i.e. that which affects the market as a whole and hence cannot be eliminated through diversification.
- (iii) Factors: Beta is a factor of the following —
 - ❖ Standard Deviation (Risk) of the Security or Portfolio,
 - ❖ Standard deviation (Risk) of the Market, and
 - ❖ Correlation between the Security and Market

The relationship is explained as follows —

$$\text{Beta of Security S } (\beta_s) = \frac{\sigma_s}{\sigma_M} \times \rho_{SM}$$

$\downarrow$
 Movement in Security S per unit

$\downarrow$
 Extent of Correlation between Security S and Market Portfolio of movement in Market Portfolio

Movement in Security S per unit X Extent of Correlation between Security S and Market Portfolio of movement in Market Portfolio Probability of such Movement)

Average Movement X Probability of the Average Movement

(iv) Beta = Expected Movement: It gives the expected movement in the return of a security (or market price of the security) per unit of movement in the market portfolio return.

(v)	Inferences:	
	Beta Value is	Security is
	Less than 1	Less risky than the market portfolio
	Equal to 1	As risky as the market portfolio
	More than 1	More risky than the market portfolio

(vi) Mathematical Formulae:

- **Using Standard Deviation and Correlation:**

$$\text{Beta of a Security } (\beta_s) = \frac{\sigma_s}{\sigma_M} \times \rho_{SM}$$

- **Using Covariance and Market Variance:**

$$\text{Beta of a Security } (\beta_s) = \frac{\text{Cov}_{SM}}{\sigma_M^2}$$

- **From Basic Data:**

$$\text{Beta of a Security } (\beta_s) = \frac{\sum R_M R_s - n \bar{R}_M \bar{R}_s}{\sum R_M^2 - n \bar{R}_M^2}$$

n = No. of pairs considered (generally the number of years / months / days)

$\sum R_M R_s$ = Aggregate of Product

$\sum R_M^2$ = Aggregate of Return Square

$\bar{R}_M$ = Mean of Market Return = Aggregate of Market Returns $\div$ No. of Years

$\bar{R}_s$ = Mean of Security Return = Aggregate of Security Returns $\div$ No. of Years

9.6.6 Expected Return of A Security Under Market Model

Market Model: Market Model does not pre-suppose the existence of risk free return for the purpose of estimating return from a security. Under this model (assumption), the market risk affects the whole of return from a security, and not just the return in excess of the risk-free rate.

Formulae:

1. **Expected Return $[E(R_p)]$:** Without considering Risk Free Return

$$\rightarrow E(R_p) = \alpha_p + (\beta_p \times R_M) + e$$

Components:

Notation	Description
α_P (Alpha Intercept)	It is the return from a Security / Portfolio when Market Return is Zero. = Average Return Less Expected Return (Beta Adjusted Return) $= \bar{R}_P - \beta_P \times R_M$ Over a longer period, α should be Zero.
$\beta_P \times R_M$	Beta Adjusted Market Return.
e	Error Factor (with Zero Mean and constant standard deviation)

2. Expected Return: Considering Risk Free Return (Risk Adjusted Excess Return Approach)

$$\rightarrow E(R_P) = \alpha_P - [R \times (1 - \beta_P)] + R_F + [\beta_P(R_M - R_F)] + e$$

Components:

Notation	Description
$\alpha_P - [R \times (1 - \beta_P)]$	Risk Adjusted Excess Return (Alpha Value adjusted for Risk Rate of Return)
R_F	Risk Free Rate of Return
$[\beta_P(R_M - R_F)]$	Market Risk Premium adjusted for Beta Factor
e	Error Factor (with Zero Mean and constant standard deviation)

Computation of Beta:

- ❖ Under Market Model, computation of Beta is done using annualized returns from security and the market on a daily basis.
- ❖ Return for this purpose = (Dividend + Price Increase) $\div$ Price at the beginning of the day.

9.6.7 Alpha

The difference between the investment's actual expected return and its fair return (as per CAPM) is known as the investment's alpha (i.e. α). It is an absolute measure, which is the return on the Portfolio in excess of the CAPM predicted return. Alpha measures the relative value addition provided by an Asset Manager compared to a market index, given a Portfolio's market risk. Alpha can also be interpreted as the deviation from the SML in the CAPM.

Features:

- (i) Alpha is appropriate, when the investment represents one of the many investments held by a client.
- (ii) Alpha enables to evaluate how well a Manager has performed, when accounting for the level of risk undertaken on to achieve their returns.

Value:

- (i) **Positive Alpha:** A positive alpha indicates that the expected return from this stock is higher than the return under CAPM, to the extent of the alpha value. Hence stocks with positive alpha should be considered as under-valued stocks and hence should be bought.

- (ii) **Negative Alpha:** A negative Alpha value indicates that expected return from the stock is less than the return under CAPM, to the extent of the alpha value. Hence stocks with negative alpha should be considered as over-valued stocks and should be sold.

9.7 PORTFOLIO ANALYSIS

9.7.1 Capital Asset Pricing Model (CAPM) and Its Assumptions

William F. Sharpe and John Linter developed the Capital Asset Pricing Model (CAPM). The model is based on the portfolio theory developed by Harry Markowitz. The model emphasises the risk factor in portfolio theory which is a combination of two risks, systematic risk and unsystematic risk. The model suggests that a security's return is directly related to its systematic risk which cannot be neutralized through diversification. The combination of both types of risks stated above provides the total risk. The total variance of returns is equal to market related variance plus company's specific variance. CAPM explains the behavior of security prices and provides a mechanism whereby investors could assess the impact of a proposed securities are determined in such a way that the risk premium or excess return are proportional to systematic risk, which is indicated by the beta coefficient. The model is used for analyzing the risk – return implication of holding securities.

A. Features:

- (a) CAPM explains the relationship between the Expected Return, Non-Diversifiable Risk (Systematic Risk) and the valuation of securities.
- (b) CAPM is based on the premise that the diversifiable risk of a security is eliminated when more and more securities are added to the Portfolio.
- (c) All securities do not have same level of systematic risk and therefore, the required rate of return goes with the level of systematic risk. It considers the required rate of return of a security on the basis of its (Systematic Risk) contribution to the total risk.
- (d) Systematic Risk can be measured by Beta, ρ , which is a function of the following —
 - ❖ Total Risk Associated with the Market Return,
 - ❖ Total Risk Associated with the Individual Securities Return,
 - ❖ Correlation between the two.

B. Assumptions:

(i) With reference to Investors:

- ❖ Investment goals of investors are rational. They desire higher return for any acceptable level of risk and lower risk for any desired level of return.
- ❖ Their objective is to maximize the utility of terminal wealth.
- ❖ Their choice is based on the risk and return of a security.
- ❖ They have homogenous expectations of Risk and Return over an identical time horizon.

(ii) With reference to Market:

- ❖ Information is freely and simultaneously available to all investors.
- ❖ Capital Market is not dominated by any individual investors.
- ❖ Investors can borrow and lend unlimited amount at the risk-free rate.
- ❖ No taxes, transaction costs, restrictions on short-term rates or other market imperfections.
- ❖ Total asset quantity is fixed, and all assets are marketable and divisible.

C. Formula for Computing Expected Return:

$$E(R_p) = R_F + \{\beta_p \times (R_M - R_F)\}$$

Where $E(R_p)$ = Expected Return on Portfolio

R_F = Risk Free Rate of Interest/ Return

β = Portfolio Beta

R_M = Expected Return on Market Portfolio

9.7.2 Security Market Line (SML) and Capital Market Line (CML)**A. Security Market Line (SML):**

Security Market Line (SML) reflects the linear relationship between Systematic Risk and Expected Return in financial markets that result when Expected Returns and Beta Coefficients are plotted across a graph. SML is the relationship between Expected Return and Beta, on which both portfolios and individual securities lie.

Purpose:

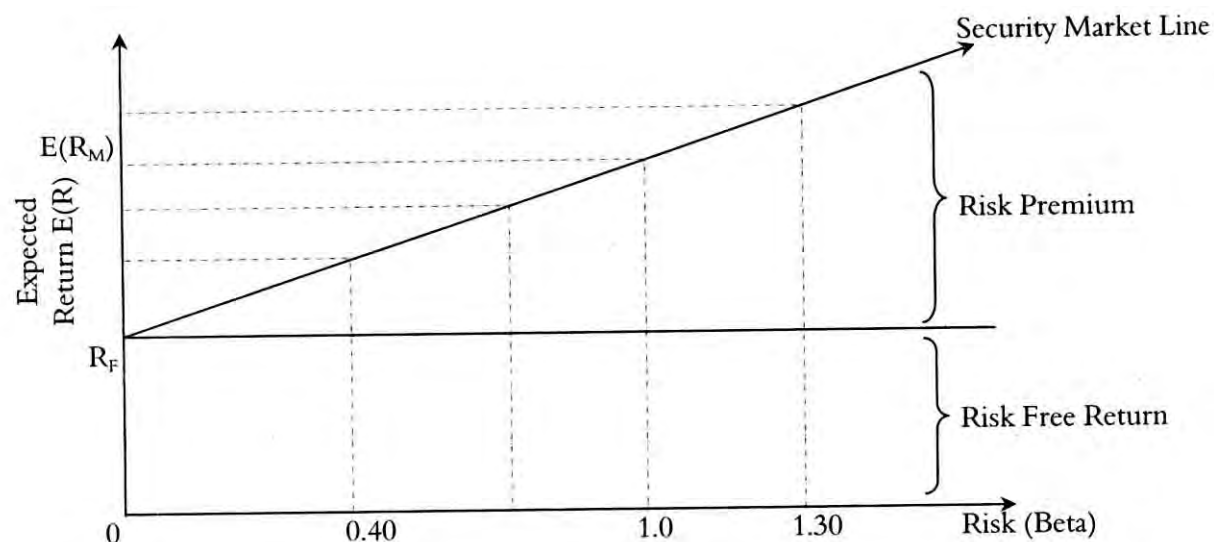
SML helps to determine if the investment is offering a return that is appropriate for its level of risk. Given its risk class, a security's return should be on the SML.

Evaluation based on SML:

Value of a security can be judged based on where the return from such security is plotted with reference to the SML as follows —

Actual Return is	Inference	Security is
Above SML	Stock is yielding a higher return than what can be expected.	Underpriced.
On SML	Stock is yielding a return equivalent to can be expected.	Correctly Priced.
Below SML	Stock is yielding a lower return than what can be expected.	Overpriced.

Graphical Representation (Security Market Line): Security Market Line expresses the basic theme of the CAPM, i.e. expected return increases linearly with risk, measured by Beta.

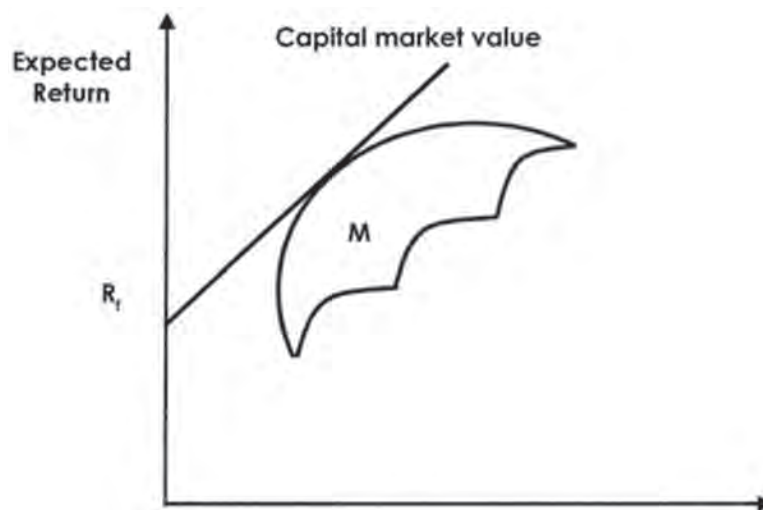


Individual Security vs. Portfolio of Securities:

- (a) A major implication of CAPM is that both an Individual Security and also all Portfolios will also be placed on the Security Market Line.
- (b) This is because of an efficient market hypothesis, i.e. all securities are expected to yield returns commensurate with their riskiness, measured by Beta.

B. Capital Market Line (CML):

The Markowitz mean-variance model is modified by introducing into the analysis the concept of risk-free asset. If it is assumed that the investor has access to risk-free securities (for example, Treasury bills) in addition to the universe of risky securities, then he can construct a new set of portfolios as depicted by the line R_fM . At point R_f the investor is investing all his investible fund in risk-free securities, whilst at point M he is holding an all-equity portfolio. The combination of risk-free investment and risky investments in portfolio which may be achieved by points between these two limits are termed lending portfolios. Let us now assume that the investor can lend and borrow funds at the same risk-free interest rate. In such circumstances the efficiency boundary simply becomes the straight line drawn from R_f which is a tangent the original risky portfolio efficiency boundary. The efficiency boundary that arises out of this assumption of the identical risk free lending and borrowing rates leads to some very important conclusions and is termed as 'Capital Market Line' (CML).



Purpose:

The Capital Market Line (CML) provides the best risk and return tradeoff for an investor. CML enables an investor to estimate the Expected Return from a Portfolio.

Feature:

- (i) Portfolio is assumed to be efficient, i.e. exact replication of the market portfolio in terms of risks and rewards.
- (ii) CML assumes no unsystematic risk, i.e. all the unsystematic risk is completely taken care off by proper diversification similar to that of market portfolio.
- (iii) Capital Market Line estimates the return for a portfolio based on the Total Risk Route, i.e. it assumes existence of perfect correlation between the portfolio return and market return.
- (iv) Individual securities does not lie on Capital Market Line. This is because they have some extent of unsystematic risk associated with their returns.

Market Price of Risk: Market Price of Risk of Portfolio X = $(R^M - R^F) \div \sigma_M$

Where — R_M Market Return

R^F Risk Free Rate of Return

σ_M Standard Deviation of the Market Portfolio.

Expected Return on Portfolio under CML Approach:

$$E(R_p) = R_F + \lambda \times \sigma_p$$

Where $E(R_p)$ — Expected Return on Portfolio

R_F — Risk Free Rate of Interest/ Return

λ = Market Price of Risk, i.e. Risk Premium per Unit of Market Risk

σ_p = Risk of the Portfolio (Standard Deviation)

C. Differences Between Security Market Line And Capital Market Line:

Aspect	Capital Market Line	Security Market Line
1. Risk Considered	Capital Market Line uses Standard Deviation, i.e. Total Risks across the x-axis.	Security Market Line uses Beta or Systematic Risk across the x-axis. (i.e. that part of Total Risk which is common to the whole of market).
2. Nature of Portfolios	It uses only efficient portfolios, i.e. one which is a perfect replication of the Market Portfolio in terms of risks and rewards.	Security Market Line uses both efficient and non-efficient portfolios.
3. Combination	Every point on the Capital Market Line is a proportional combination between Risk free Rate of Return and Market Return.	It graphs all portfolios and securities which lie on and off the Capital Market Line.

D. Characteristic Line:

Characteristic Line is a graph depicting the relationship between Security's Returns and Market Index Returns. Security Characteristic Line is a time series graph. Return considered for this is the excess return, i.e. expected return over and above the Risk Free Rate of Return.

Purpose:

Security Characteristic Line is used to estimate beta and also to determine how a security return correlates to a market index return.

Beta:

Beta estimate comes from the slope estimate of the security characteristic line.

Graphic Depiction:



*represents set of return of the Security and Return of the Market at a particular point.

..... represents Characteristic Line (a line which covers most of the dots on the graph)

E. Distinguish between a Security Market Line (SML) and Characteristic Line:

Aspect	Security Market Line	Characteristic Line
Scheme	It represents the relationship between return and risk (measured in terms of systematic risk) of a security or portfolio.	It represents the relationship between the returns of two securities or a security and the market return, over a period of time.
Nature of Graph	Security Market Line is a cross-sectional graph.	Security Characteristic Line is a Time Series Graph.
Comparison	Security Market Line graphs beta versus expected return.	Characteristic Line graphs time series of Security Returns versus the Index Returns.
Utility	It is used for estimating the expected return for a security relative to its beta risk.	To estimate beta and also to determine how a security return correlates to a market index return.

9.7.3 Decision Making on Valuation of A Portfolio / Security

The Capital Asset Pricing Model (CAPM) is essentially a model for determining the Intrinsic Value or Equilibrium Price of an Asset. The Equilibrium or Intrinsic Price of an Asset is determined using the Expected Return as arrived at using the CAPM. Expected Return is the minimum return that the investors require from the asset in relation to the relative systematic risk of the Asset. Price of an asset is the Present Value of the Future Cash Flows generated by the Asset as discounted by the Expected Return as determined using the CAPM.

	Situation	Inference	Action
1	CAPM Return < Estimated Return.	Undervalued Security	BUY
2	CAPM Return = Estimated Return.	Correctly Valued Security	HOLD
3	CAPM Return > Estimated Return.	Overvalued Security	SELL

9.7.4 Risk Return Ratio

Risk Return Ratio is the average return (in excess of the risk-free return) per unit of risk undertaken. It tends to measure the benefit of taking that extra risk. An investor would earn a return at risk-free rate,

without assuming any risk. What return did he obtain for taking that extra risk, is measured by Risk-Return Ratio.

Mathematical Notation:

- **If Beta is taken as a Measurement of Risk:**

$$\text{Risk Return Ratio} = \frac{R_s - R_F}{\beta_s}$$

- **If Standard Deviation is taken as risk:**

$$\text{Risk Return Ratio} = \frac{R_s - R_F}{\sigma_s}$$

Where,

R_s = Return of Security S

R_F = Risk Free Return

β_s = Beta of Security S with reference to the Market

σ_M = Standard Deviation of Market

- **Equilibrium Market:**

In an equilibrium market, where all the securities are correctly priced, the Risk-Return Ratio (based on Beta) should be the same for all the securities, i.e. Risk-Return Ratio of Security S will be equivalent to Risk- Return Ratio of Security T.

$$\rightarrow \text{Risk-Return Ratio of Security S} = \frac{R_s - R_F}{\beta_s} = \frac{R_T - R_F}{\beta_T} = \text{Risk-Return Ratio of Security T}$$

9.7.5 Arbitrage Pricing Model

Unlike the CAPM which is a Single Factor Model, the APT is a Multi Factor Model having a whole set of Beta Values - one for each Factor. Arbitrage Pricing Theory states that the expected return on an investment is dependent upon how that investment reacts to a set of individual Macro-Economic factors (degree of reaction measured by the Betas) and the risk premium associated with each of those macro - economic factors. The Arbitrage Pricing Theory developed by Ross (1976) holds that there are four factors which explain the risk premium relationship of a particular security. Several factors can be identified to have a bearing on the Return expectation of a security. Most factors such as inflation and money supply, interest rate, industrial production and personal consumption are inter-related. It seeks to identify the risk return relationship, for each of the factors individually.

According to Capital Asset Pricing Model,

$$\text{Expected Return} = R_f + R_p\beta$$

Where, R_f = Risk Free Rate.

R_p = Average Risk Premium considering all factors put together i.e. $[R_M - R_F]$

In Arbitrage Pricing Theory,

$$\text{Expected Return} = R_f + R_1\beta_1 + R_2\beta_2 + R_3\beta_3 + \dots + R_n\beta_n$$

Where, R_n is the risk premium for each of the factors in the model and β_n is the measure of sensitivity of the particular security, to each of the factors.

9.7.6 Expected Return of A Portfolio

A. Based on Returns of Stock:

- (i) The Expected Return on a Portfolio is computed as the weighted average of the expected returns on the stocks which comprise the Portfolio. The weights reflect the proportion of the Portfolio invested in the stocks.

- (ii) Expected Return can be expressed as- $E(R_p) = \sum_{i=1}^N W_i E[R_i]$

Where,

$E[R_p]$ = Expected return on the portfolio.

N = Number of stocks in the portfolio

W_i = Proportion of the Portfolio Invested in Stock i , and

$E[R_i]$ = Expected Return on stock i .

B. Based on Probability of Expected Returns of the Portfolio:

- (i) Expected Return is the Mean Return computed on the basis of the probability of returns expected from the portfolio as a whole.

- (ii) Mathematically, it is expressed as $E(R_p) = \sum p_i R_i$

Where,

$E[R_p]$ = Expected return on the Portfolio.

p_i = Probability of Return in state / condition i

R_i = Return of the Portfolio in state / condition i

Note: Sum total of p , is 1.

9.7.7 Standard Deviation of A Portfolio

Standard Deviation as a Measure of Risk:

Risk of a portfolio is not equal to the sum of its parts. This is because all securities are neither correlated with each other to the same extent or in the same manner, nor are relationship expressible in linear or arithmetic terms. Choice of securities in a portfolio can either go about to increase the risk factor which is greater than the sum of the individual risk of securities. It can also be lower than the risk factor of the least risky security in the portfolio. Therefore, Standard Deviation of a Portfolio is not the weighted average of the standard deviation of its individual securities, since it does not consider the correlation between different such securities and a common base, i.e. market return.

Formulae:

- (a) **Formulae (Two Securities):** Risk of Portfolio, i.e. Standard Deviation of Portfolio of A and B

$$\sigma_{AB} = \sqrt{(\sigma_A^2 \times W_A^2) + (\sigma_B^2 \times W_B^2) + 2(\sigma_A \times W_A \times \sigma_B \times W_B \times \rho_{AB})}$$

- (b) **Formulae (Three Securities):** Standard Deviation of 3 securities σ_{STP} is given by —

$$\sqrt{(\sigma_P^2 \times W_P^2) + (\sigma_Q^2 \times W_Q^2) + (\sigma_R^2 \times W_R^2) + 2(\sigma_P \times W_P \times \sigma_Q \times W_Q \times \rho_{PQ}) + 2(\sigma_P \times W_P \times \sigma_R \times W_R \times \rho_{PR}) + 2(\sigma_Q \times W_Q \times \sigma_R \times W_R \times \rho_{QR})}$$

(b) Matrix Approach:

Securities		P	Q	R
	Weights	WP	WQ	WR
P	WP	$(\sigma^2 P)$	(Cov_{PQ})	(Cov_{PR})
Q	WQ	(Cov_{PQ})	$(\sigma^2 Q)$	(Cov_{QR})
R	WR	(Cov_{PR})	(Cov_{QR})	$(\sigma^2 R)$

After plotting the values in the above matrix (which can be extended to n securities), variance can be measured as follows —

	Description
1	$W_P \times W_P \times \sigma^2 P$
2	$W_P \times W_Q \times Cov_{PQ}$
3	$W_P \times W_R \times Cov_{PR}$
4	$W_Q \times W_P \times Cov_{PQ}$
5	$W_Q \times W_Q \times \sigma^2 Q$
6	$W_Q \times W_R \times Cov_{QR}$
7	$W_R \times W_P \times Cov_{PR}$
8	$W_R \times W_Q \times Cov_{QR}$
9	$W_R \times W_R \times \sigma^2 R$
Total	Variance of Portfolio

Note: The Covariance between the Securities P and Q is given by the Formula -

$$Cov_{PQ} = \beta_P \times \beta_Q \times \sigma^2_M$$

Where, σ^2_M = Variance of Market

(c) The Total Risk of the Portfolio can be split as follows (Variance Approach)-

$$\text{Systematic Risk of the Portfolio} = \beta_{\text{portfolio}} \times \sigma^2_M$$

$$\text{Unsystematic Risk of the Portfolio} = \sigma^2_{\text{portfolio}} - \text{Systematic Risk of the Portfolio}$$

9.7.8 Co-efficient of Variation As A Tool to Measure Risk

Co-efficient of Variation translates the standard deviation of different probability distributions so as to compare on the basis of one particular base. It is the deviation per unit of the mean return.

The coefficient of variation for a probability distribution is the ratio of its standard deviation to its expected value.

Example: Two securities A and B have a standard deviation of 10% and 20% each. On first glance, Security B is more riskier than Security A. If mean (average) returns of Securities A and B is 10% and 30% respectively, then we can observe that A has more risk per unit of return, while B has a lower risk per unit of return.

Particulars	Security A	Security B
Standard Deviation	10%	20%
Mean Return (Average Expected Return)	10%	30%
Co-Efficient of Variation [Standard Deviation ÷ Average Return]	10% ÷ 10% = 1	20% ÷ 30% = 0.67

Purpose:

Standard Deviation measures the dispersion in absolute terms. It does not provide a base for comparison. Co-efficient of variance provides a common base, i.e. extent of variance, which can be used to compare different projects / investments.

Formula:

Co-efficient of Variation = Standard Deviation ÷ Expected NPV

9.7.9 Co-variance Explains the Deviation of The Return of Portfolio from its Mean Value

Covariance is an absolute measure of co-movement between two variables, i.e. the extent to which they are generally above their means or below their means at the same time.

Formula:

Covariance between M and S is computed as follows — $Cov_{MS} = \sum [D_M \times D_S] \div n$ Where, D_M represents the Deviation of Return from the Mean Return of Portfolio M. D_S represents the Deviation of Return from the Mean Return of Portfolio S.

Range:

Since Covariance is an absolute measure of relationship between two securities, its value will range between $+\infty$ to $-\infty$.

9.7.10 Correlation and Diversification

A. Correlation Co-efficient:

Correlation Co-efficient is a measure of closeness of the relationship between two random variables and is bounded by the values +1 and -1.

It can be equated to probability of movement. A correlation value of 0.70 can be interred as a 70% movement in values of two variables in the same direction. A negative of 0.70 can be inferred as a 70% movement in values of two variables in opposite direction.

Formulae:

The formulae for determining the correlation coefficient are—

(i) Based on Covariance and Standard Deviation:

$$\rho_{XY} = Cov_{XY} \div (\sigma_X \times \sigma_Y)$$

(ii) Based on Probability Distribution of Future Returns:

$$\rho_{XY} = \frac{\sum [X_i - E(X_i)] \times [Y_i - E(Y_i)]}{\sigma_X \sigma_Y}$$

(iii) Based on historical realized returns

$$\rho_{XY} = \frac{n \sum X_i Y_i - \sum X_i \sum Y_i}{\sqrt{[n \sum X_i^2 - (\sum X_i)^2] [n \sum Y_i^2 - (\sum Y_i)^2]}}$$

Valuation and Inference:

Portfolio Risk will be —

- (a) Maximum when two components of a portfolio stand perfectly positively correlated.
- (a) Minimum when two components of a portfolio stand perfectly negatively correlated.

B. Diversification:

Diversification refers to investing in more than one security, i.e. dividing the Portfolio into different stocks and not investing the money in one particular stock. Some of the risks associated with individual assets can be eliminated by forming Portfolios, thereby spreading an investment across assets (and thereby forming a Portfolio). This is called diversification.

Features:

- (i) Diversification reduces risks because prices of different stocks do not move exactly together. It helps to reduce Portfolio risk by eliminating unsystematic risk for which investors are not rewarded.
- (ii) Investors are rewarded for taking market risk.
- (iii) Diversification averages the returns of the assets within the Portfolio, thereby it attenuates the potential highs (and lows).
- (iv) Diversification among companies, industries and asset classes, protects against business risk, financial risk and volatility.

C. Diversifiable Risks:

- (i) Unsystematic Risk is the risk that can be diversified, because it is the Company-specific risk.
- (ii) Unsystematic Risk is that portion of the total risk that arises due to factors which affect the internal working of the Firm. It could include sudden unforeseen event like strikes, fire or something as simple as slumping sales.
- (iii) There is no reward for taking on diversifiable risk.

D. Relationship Between Correlation And Diversification:

Relationship Between Securities: The level of diversification of a Portfolio depends on how the investments (in the Portfolio) react with one another. If they offset each other properly, then the value of Portfolio is well protected.

Examination of Correlation: The interaction among the investments can be determined by examining the correlation coefficient between pairs of investments.

Inference from Correlation: The relationship between Correlation and Diversification can be described as follows —

Correlation coefficient	Nature	Diversification
$p = +1$	Perfectly positively correlated	(a) Investments do not offset each other and they move in tandem. (b) No diversification.
$p = -1$	Perfectly negatively correlated	(a) Investments offset each other totally and they move in opposite direction. (b) Full diversification achieved.
$p = 0$	No correlation	(a) No predictability of movement of investments. (b) Not a good diversification.



9.7.11 A Portfolio With The Minimum Level of Risk

The following formula is used to determine the appropriate proportions that will create the minimum Variance Portfolio (containing two securities A and B —

$$\text{Proportion of Investment in Security A, } W_A = \frac{\sigma_B^2 - \text{Cov}_{AB}}{\sigma_A^2 + \sigma_B^2 - 2\text{Cov}_{AB}}$$

$$\text{Proportion of Investment in Security B, } W_B = 1 - W_A$$

Where — W_A is the Proportion of Investment in Portfolio A.

W_B is the Proportion of Investment in Portfolio B.

σ_A is the Standard Deviation of Portfolio A,

σ_B is the Standard Deviation of Portfolio B.

Cov_{AB} is the Co-variance between Portfolio A and B.

9.7.12 Hedging of Risks Using Risk Free Investments

A. Hedging using Risk free Investments to increase Risk (Increase Portfolio Value)

(i) **Object:** Increase Beta Value of the Portfolio

(ii) **Action:** Buy Stock and Sell Risk free Investments.

(iii) **Value of Risk Free Investments to be bought:**

$$= \text{Portfolio Value} \times [\text{Desired Value of Beta} - \text{Beta of the Portfolio}]$$

(iv) **Mathematical Notation:**

$$\text{Value of Risk free Investments} = (\text{Portfolio Value} \times \text{Desired Beta}) \text{ Less } (\text{Portfolio Value} \times \text{Present Beta})$$

(v) **Reasoning:**

Desired Beta is the weighted average beta of the risk-free Investments and the Beta of the Remaining Investments. Risk-free Investments do not carry any Beta. By selling Risk-free investments and investing the same in the Portfolio, risk attached to the Portfolio increases, and thereby Portfolio Risk increases.

Example:

Portfolio Value is ₹1,00,000 and Beta is 1.20. Desired Beta is 2.00. Hence, the value of Risk Free Investments to be sold to increase the level of Risk is ₹80,000 [Portfolio Value ₹1,00,000 X Desired Beta 2.00 - Portfolio Value ₹1,00,000 X Existing Beta 1.20]

B. Hedging using Risk free Investments to reduce Risk (Reduce Erosion in Value)

(i) **Object:** Reduce Beta Value of the Portfolio

(ii) **Action:** Sell Stock and Buy Risk free Investments.

(iii) **Value of Risk Free Investments to be bought:**

$$\text{Portfolio Value} \times [\text{Beta of the Portfolio} - \text{Desired Value of Beta}]$$

(iv) **Mathematical Notation:**

$$\text{Value of Risk free Investments} = \text{Portfolio Value} \times \text{Present Beta} \text{ Less } \text{Portfolio Value} \times \text{Desired Beta}.$$

(v) **Reasoning:**

Risk free Investments do not carry any Beta. By selling the Portfolio stock, and buying risk-free investments, Risk attached to the Portfolio gets reduced, and thereby Portfolio Risk reduces.

Example: Portfolio Value is ₹ 1,00,000 and Beta is 2.00. Desired Beta is 1.20. Hence, the value of Risk Free Investments to be bought to reduce the level of Risk is ₹ 80,000 [Portfolio Value ₹ 1,00,000 X Present Beta 2.00 - Portfolio Value ₹ 1,00,000 X Desired Beta 1.20]

9.7.13 Computation of Project Beta

Beta of a project is the weighted average of the Beta of all the assets and the Projects.

Project Beta: =Beta of Assets = Beta of Liabilities

Beta of Assets = Weighted Average Beta of Equity and Debt Employed in the Project

The Beta Balance Sheet:

(a) Single Project Balance Sheet (Assuming No Taxes):

Liabilities	Weight	Beta	Assets = Capital Employed	Weight	Beta
Equity [E]	W_E	β_E	Project A	1.00	β_A
Debt [D]	W_D	β_D			
Total	1.00	PA	Total		β_A

→ Beta of Project A [β_A] = Weighted Average Beta of Sources of Capital

$$= W_E \times \beta_E + W_D \times \beta_D$$

(b) Two Project Balance Sheet:

(i) (Assuming No Taxes):-

Liabilities	Weight	Beta	Assets = Capital Employed	Weight	Beta
Equity [E]	W_E	β_E	Project A	W_A	β_A
Debt [D]	W_D	β_D	Project B	W_B	β_B
Total	1.00		Total	1.00	

→ Beta of Assets [β_{Asset}] = Beta of Liabilities [$\beta_{\text{Liabilities}}$]

→ Weighted Average Asset Beta = Weighted Average Beta of Sources of Capital

$$\rightarrow W_A \times \beta_A + W_B \times \beta_B = W_E \times \beta_E + W_D \times \beta_D$$

(ii) If Taxes are Considered: Weight of Debt will be measured as $W_D \times (1 - \text{Tax Rate})$

$$\text{Formula: Project Beta } \beta_E = \frac{\beta_E \times \text{Equity}}{\text{Equity} + \text{Debt}(1 - \text{Tax})} + \frac{\beta_{\text{Debt}} \times \text{Debt} \times (1 - \text{Tax})}{\text{Equity} + \text{Debt}(1 - \text{Tax})}$$

β_E represents the Beta of Equity of the Project.

β_{Debt} represents the Beta of Debt of the Project

9.7.14 Levered and Unlevered Firms, Proxy Beta

Unlevered Firm: If a Company finances its investments and projects completely with Equity (without leveraging Debt Finance), then the Company is known as an Unlevered Firm.

Levered Firm: Levered Firm is the firm whose Capital Structure includes both the components of Debt and Equity.

Proxy Beta: Proxy Beta is the beta of a Levered Firm, arrived at from the beta of an Unlevered Firm.

ILLUSTRATIONS

Illustration 1.

If the risk free rate of interest (R_f) is 10%, and expected return on market portfolio (R_m) is 15%, ascertain expected return of the portfolio if portfolio betas are — (a) 0.10 and (b) 0.30.

Solution:

1. Rule for determining Expected Return on Portfolio under CAPM

Under Capital Asset Pricing Model (CAPM) $R_p = R_f + (\beta \times (R_m - R_f))$

Notation	Particulars	Value
R_p	Expected Return on Portfolio	To be computed
R_f	Risk Free Rate of Interest/ Return	10%
β	Portfolio Beta	0.10/0.30
R_m	Expected Return on Market Portfolio	15%

2. Computation of Expected Return on Portfolio

Beta	Expected Return = $R_f + \beta \times (R_m - R_f)$
0.10	$= 10\% + 0.10(15\% - 10\%) = 10.5\%$
0.30	$= 10\% + 0.30(15\% - 10\%) = 11.5\%$

Illustration 2.

Compute Return under CAPM and the Average Return of the Portfolio from the following information—

investment in equity shares	Initial price ₹	Dividends ₹	Market price at the end of the year ₹	Beta risk factor
A. A Ltd.	25	2	50	0.8
B Ltd.	35	2	60	0.7
C Ltd.	40	2	130	0.5
B. Govt. of Indian Bonds	1,000	150	1,010	0.99

Risk free return = 15%

Solution:

1. Computation of Expected Return and Average Return

Securities	Cost ₹	Dividend ₹	Capital Gain ₹	Expected Return = $R_f + (R_m - R_f)$
Epsilon Limited	25	2	25	$[15 + 0.80 \times (27.82 - 15)] = 25.26\%$
Sigma Limited	35	2	25	$[15 + 0.70 \times (27.82 - 15)] = 23.97\%$
Omega Limited	40	2	90	$[15 + 0.50 \times (27.82 - 15)] = 21.41\%$
GOI Bonds	1,000	150	10	$[15 + 0.99 \times (27.82 - 15)] = 27.69\%$
Total	1,100	156	150	

Notes:

1. Return on Market Portfolio: Expected Return on Market Portfolio (R_m)

$= (\text{Dividend} + \text{Capital Gains}) \div \text{Cost of the Total Investment}$

$= (156 + 150) / 1,100 \times 100 = 27.82\%$

In the absence of Return of a Market Portfolio, it is assumed that portfolio containing one unit of the four securities listed above would result in a completely diversified portfolio, and therefore represent the market portfolio.

2. Portfolio's Expected Return based on CAPM:

(a) If the Portfolio contains the above securities in equal proportion in terms of value — Expected Return = $(25.26 + 23.97 + 21.41 + 27.69) \div 4 = 24.58$

(b) If the Portfolio contains one unit of the above securities, then

Securities	Cost ₹	Proportion	Expected Return	Weighted Return
1	2	$3 = 2 \div 1,100$	4	$5 = 3 \times 4$
A Limited	25	0.023	25.26%	0.581%
B Limited	35	0.032	23.97%	0.767%
C Limited	40	0.036	21.41%	0.771%
GOI Bonds	1,000	0.909	27.69%	25.170%
Total	1,100			27.289%

Therefore, Expected Return from Portfolio (based on CAPM) = 27.29%

Illustration 3.

Subho has invested in four securities M, N, O and P, the particulars of which are as follows —

Security (₹)	M	N	O	P
Amount Invested	1,25,000	1,50,000	80,000	1,45,000
Beta (β)	0.60	1.50	0.90	1.30

If RBI Bonds carries an interest rate of 8% and NIFTY yields 14%, what is the expected return on portfolio? If investment in Security O is replaced by investment in RBI Bonds, what is the corresponding change in Portfolio Beta and expected return?

Solution:

1. Computation of Expected Return on Portfolio (Under CAPM)

(a) Computation of Weighted Beta (Beta of the Portfolio)

Security	Amount Invested (₹)	Proportion of Investment to Total Investment	Beta of Investment	Weighted Beta
(1)	(2)	(3) = (2) ÷ 5,00,000	(4)	(5) = (3) x (4)
M	1,25,000	0.25	0.60	0.150
N	1,50,000	0.30	1.50	0.450
O	80,000	0.16	0.90	0.144
P	1,45,000	0.29	1.30	0.377
Total	5,00,000	1.00		1.121

(b) Computation of Expected Return on Portfolio

$$\begin{aligned}
 \text{Expected Return } [E(R_p)] &= R_f + \beta_p \times (R_m - R_f) \\
 &= 8\% + [1.121 \times (14\% - 8\%)] \\
 &= 8\% + [1.121 \times 6\%] = 8\% + 6.726\% = 14.726\%
 \end{aligned}$$

1. Computation of Expected Return [Investment in C, replaced by RBI Bonds] (CAPM)

(a) Computation of Weighted Beta (Beta of the Portfolio)

Security	Amount Invested	Proportion of Investment to Total Investment	Beta of Investment	Weighted Beta
(1)	(2)	(3) = (2) / 5,00,000	(4)	(5) = (3) X (4)
M	1,25,000	0.25	0.60	0.150
N	1,50,000	0.30	1.50	0.450
RBI Bonds	80,000	0.16	0.00	0.000
P	1,45,000	0.29	1.30	0.377
Total	5,00,000	1.00		0.977

(b) Computation of Expected Return on Portfolio

Expected Return [E(RP)]

$$= R_f + \beta_p \times (R_m - R_f)$$

$$= 8\% + [0.977 \times (14\% - 8\%)]$$

$$= 8\% + [0.977 \times 6\%] = 8\% + 5.862\% = 13.862\%$$

Illustration 4.

Stocks P and Q have the following historical returns —

Year	2009	2010	2011	2012	2013
Stock P's Return (K_p)	-12.24	23.68	34.44	5.82	28.30
Stock Q's Return (K_q)	-7.00	25.55	44.09	2.20	20.16

You are required to calculate the average rate of return for each stock during the period 2009 through 2013. Assume that someone held a Portfolio consisting 50% of Stock P and 50% of Stock Q.

What would have been the realized rate of return on the Portfolio in each year from 2009 through 2013? What would be the average return on the Portfolio during the period? (You may assume that year ended on 31st March).

Solution:

1. Calculation of average rate of return on Portfolio during 2009-2013

Year	Stock P's Return %	Stock Q's Return %
2009	-12.24	-7.00
2010	23.68	25.55
2011	34.44	44.09
2012	5.82	2.20
2013	28.30	20.16
Total	80.00	85.00
Average rate of return	80/5 years = 16%	85/5 years = 17%

2. Calculation of realized rate of return on Portfolio during 2009-2013

Year	Stock P			Stock Q			Total
	Proportion	Return	Net Return	Proportion	Return	Net Return	Net Return
1	2	3	4 = 3 x 2	5	6	7 = 5 x 6	8 = 4 + 8
2009	0.50	-12.24	-6.12	0.50	-7.00	-3.50	-9.62
2010	0.50	23.68	11.84	0.50	25.55	12.78	24.62
2011	0.50	35.44	17.72	0.50	44.09	22.05	39.77
2012	0.50	5.82	2.91	0.50	2.20	1.10	4.01
2013	0.50	28.30	14.15	0.50	20.16	10.08	24.23
			40.50			42.51	83.01

Average rate of return = ₹83.01 ÷ 5 = 16.60%

Illustration 5.

Securities X and Y have standard deviations of 3% and 9%. Nitin is having a surplus of ₹20 Lakhs for investment in these two securities. How much should he invest in each of these securities to minimize risk, if the correlation co-efficient for X and Y is — (a) -1; (b) -0.30; (c) 0; (d) 0.60

Solution:**1. Basic Values of Factors for Determination of Portfolio Risk**

Standard Deviation of Security X	σX	3%
Standard Deviation of Security Y	σY	9%
Correlation co-efficient of Securities X and Y	ρ_{XY}	-1, -0.30, 0, 0.60
Weight of Security X	W_x	a
Weight of Security Y	W_y	1-a

2. Computation of Investment in Securities

$$\text{Proportion of Investment in Security X, } W_x = \frac{\sigma Y^2 - \text{Cov}_{XY}}{\sigma X^2 + \sigma Y^2 - 2\text{Cov}_{XY}}$$

$$\text{Proportion of Investment in Security Y, } W_y = 1 - W_x$$

$$\text{Cov}_{XY} = \rho_{XY} \times \sigma X \times \sigma Y$$

If ρ_{XY} is	Cov_{XY} is	Computation	Investment
-1	-27 (-1x3x9)	$\rightarrow W_x = [\sigma Y^2 - \text{Cov}_{XY}] \div [\sigma X^2 + \sigma Y^2 - 2\text{Cov}_{XY}]$ $\rightarrow W_x = [9^2 - (-27)] \div [3^2 + 9^2 - 2 \times (-27)]$ $\rightarrow W_x = [81 + 27] \div [9 + 81 + 54]$ $\rightarrow W_x = 108/144 = 0.75$	0.750 in X 0.250 in Y ₹15,00,000 in X ₹5,00,000 in Y
-0.3	-8.1 (-0.3x3x9)	$\rightarrow W_x = [\sigma Y^2 - \text{Cov}_{XY}] \div [\sigma X^2 + \sigma Y^2 - 2\text{Cov}_{XY}]$ $\rightarrow W_x = [9^2 - (-8.1)] \div [3^2 + 9^2 - 2 \times (-8.1)]$ $\rightarrow W_x = [81 + 8.1] \div [9 + 81 + 16.2]$ $\rightarrow W_x = 89.1 / 106.2 = 0.839$	0.839 in X 0.161 in Y ₹ 16,78,000 in X ₹3,22,000 in Y

0	0 (0x3x9)	$\rightarrow WX = [\sigma Y^2 - \text{Cov}XY] \div [\sigma X^2 + \sigma Y^2 - 2\text{Cov}XY]$ $\rightarrow WX = [92 - 0] \div [32 + 92 - 2 \times 0]$ $\rightarrow WX = [81 - 0] \div [9 + 81 - 0]$ $\rightarrow WX = 81/90 = 0.90$	0.900 in X 0.100 in Y ₹ 18,00,000 in X ₹ 2,00,000 in Y
0.60	16.2 (0.6 x 3 x 9)	$\rightarrow WX = [\sigma Y^2 - \text{Cov}XY] \div [\sigma X^2 + \sigma Y^2 - 2\text{Cov}XY]$ $\rightarrow WX = [92 - 16.2] \div [32 + 92 - 2 \times 16.2]$ $\rightarrow WX = [81 - 16.2] \div [9 + 81 - 32.4]$ $\rightarrow WX = 64.8 / 57.60 = 1.125 > 1$ At this correlation level, risk reduction is not possible.	Reducing Risk below 3% is not possible.

Illustration 6.

A Ltd., and B Ltd., has the following risk and return estimates

R_A	R_B	σ_A	σ_B	(Correlation coefficient) = r_{AB}
20%	22%	18%	15%	-1.50

Calculate the proportion of investment in A Ltd., and B Ltd., to minimize the risk of Portfolio.

Solution:

1. Basic Values of Factors for Determination of Portfolio Risk

Standard Deviation of Security A	σ_A	18%
Standard Deviation of Security B	σ_B	15%
Correlation co-efficient of Securities A and B	ρ_{AB}	-1.50
Weight of Security A	W_A	a
Weight of Security B	W_B	1-a

2. Computation of Investment in Security A (W_A)

$$\text{Proportion or Investment in A Ltd., } W_A = \frac{\sigma_B^2 - \text{Cov}_{AB}}{\sigma_A^2 + \sigma_B^2 - 2\text{Cov}_{AB}}$$

$$\text{Proportion of Investment in B Ltd., } W_B = 1 - W_A$$

(a) Computation of Covariance

$$\begin{aligned} \text{Cov}_{AB} &= \rho_{AB} \times \sigma_A \times \sigma_B \\ &= -1.50 \times 18 \times 15 = -405 \end{aligned}$$

(b) Proportion of investment in A Ltd.

$$\begin{aligned} \rightarrow W_A &= [\sigma Y^2 - \text{Cov}_{XY}] \div [\sigma X^2 + \sigma Y^2 - 2\text{Cov}_{XY}] \\ \rightarrow W_A &= [15^2 - (-405)] \div [18^2 + 15^2 - 2 \times (-405)] \\ \rightarrow W_A &= [225 + 405] \div [324 + 225 + 810] = 630/1359 = 0.46 \end{aligned}$$

(c) Proportion of investment in B Ltd.

$$\rightarrow W_B = 1 - 0.46 = 0.54$$

Illustration 7.

Five Star Ltd., has been specially formed to undertake two investment opportunities. The risk and return characteristics of the two projects are shown below:

Project	P	Q
Expected return	15%	22%
Risk	3%	7%

Five Star plans to invest 80% of its available funds in project P and 20% in Q. The directors believe that the correlation co-efficient between the returns of the projects is +1.0.

Required—

- Calculate the returns from the proposed portfolio of Projects P and Q.
- Calculate the risk of the portfolio;
- Suppose the correlation coefficient between P and Q was -1. How should the company invest its funds in order to obtain zero risk portfolio.

Solution:

1. Return of the Portfolio

Securities	Expected return	Proportion	Return from portfolio
(1)	(2)	(3)	(4) = (2) × (3)
P	15	0.8	12
Q	22	0.2	4.4
Return of the Portfolio			16.4

2. Basic Values of Factors for Determination of Portfolio Risk

Particulars	Notation	Value
Standard Deviation of Security P	σ_P	3%
Standard Deviation of Security Q	σ_Q	7%
Correlation co-efficient of Securities P and Q	ρ_{PQ}	+ 1
Weight of Security P	W_P	0.80
Weight of Security Q	W_Q	0.20

Risk of Portfolio i.e. Standard Deviation of Portfolio of P and Q [80% : 20% Ratio]

$$\begin{aligned}
 \sigma_{PQ} &= \sqrt{(\sigma_P^2 \times W_P^2) + (\sigma_Q^2 \times W_Q^2) + 2(\sigma_P \times W_P \times \sigma_Q \times W_Q \times \rho_{PQ})} \\
 &= \sqrt{(3^2 \times 0.80^2) + (7^2 \times 0.20^2) + (2 \times 3 \times 0.80 \times 7 \times 0.20 \times 1)} \\
 &= \sqrt{(9 \times 0.64) + (49 \times 0.04) + (6.72)}
 \end{aligned}$$

$$\text{Risk} = \sqrt{5.76 + 1.96 + 6.72} = \sqrt{14.44} = 3.8\%$$

3. Computation of Investment in Security A and B (WA)

$$\text{Proportion of Investment in Security P, } W_P = \frac{\sigma_Q^2 - \text{Cov}_{PQ}}{\sigma_P^2 + \sigma_Q^2 - 2\text{Cov}_{PQ}}$$

$$\text{Proportion of Investment in Security Q, } W_Q = 1 - W_P$$

$$\text{Cov}_{PQ} = \rho_{PQ} \times \sigma_P \times \sigma_Q$$

$$= -1 \times 3 \times 7 = -21$$

$$\rightarrow W_P = [\sigma_Q^2 - \text{Cov}_{PQ}] \div [\sigma_P^2 + \sigma_Q^2 - 2\text{Cov}_{PQ}]$$

$$\rightarrow W_P = [7^2 - (-21)] \div [3^2 + 7^2 - 2 \times (-21)]$$

$$\rightarrow W_P = [49 + 21] \div [9 + 49 + 42]$$

$$\rightarrow W_P = 70 / 100 = 0.70$$

$$\text{Proportion of Investment in Security Q, } W_Q = 1 - W_P = 1 - 0.70 = 0.30$$

Illustration 8.

An investor has two portfolios known to be on minimum variance set for a population of three securities R, S and T below mentioned weights —

	W_R	W_S	W_T
Portfolio X	0.30	0.40	0.30
Portfolio Y	0.20	0.50	0.30

It is supposed that there are no restrictions on short sales.

- What would be the weight for each stock for a portfolio constructed by investing ₹6,000 in Portfolio X and ₹4,000 in Portfolio Y?
- Suppose the investor invests ₹5,000 out ₹10,000 in Security R. How he will allocate the balance between security S and T to ensure that his portfolio is on minimum variance set?

Solution:

1. Investment in Individual Securities

Security	Portfolio X	Portfolio Y	Total	Weight
R	$6,000 \times 0.30 = 1,800$	$4,000 \times 0.20 = 800$	2,600	$2,600 \div 10,000 = 0.26$
S	$6,000 \times 0.40 = 2,400$	$4,000 \times 0.50 = 2,000$	4,400	$4,400 \div 10,000 = 0.44$
T	$6,000 \times 0.30 = 1,800$	$4,000 \times 0.30 = 1,200$	3,000	$3,000 \div 10,000 = 0.30$
	6,000	4,000	10,000	1.0000

2. Investment Strategy to Ensure Minimum Variance

Given the following equations $\rightarrow W_R = 0.50$ (₹5,000 ÷ ₹10,000)

$$\rightarrow W_R + W_S + W_T = 1$$

Therefore it naturally follows that

$$\rightarrow W_T + W_S = 0.50 \dots (1)$$

A simple linear equation can be establishing an equation between two variables W_R and W_S or the Variables W_S and W_T in the given manner—

$$W_T = a + bW_S$$

Substituting the values of W_R & W_S from the data given (Portfolio X and Y), we get -

$$0.30 = a + b \times 0.40$$

$$0.30 = a + b \times 0.50$$

$$b = 0$$

$$a = 0.30$$

$$W_T = 0.30 - 0W_S$$

or

$$W_T + 0W_S = 0.30 \dots (2)$$

Therefore solving (1) and (2) we get $W_T = 0.30$ and $W_S = 0.20$

Conclusion: Allocation of Funds -

$R = ₹ 5,000$ (Given)

$S = 0.20 \times ₹ 10,000 = ₹ 2,000$.

$T = 0.30 \times ₹ 10,000 = ₹ 3,000$.

Alternatively,

Since the Proportion of Investment in T is 0.30 and is constant across both the Portfolio, any linear equation drawn from the Data given would result in the Weight of T being a constant 0.30.

Therefore $W_R = 0.50$ (Given), $W_T = 0.30$ (Constant), therefore $W_S = 0.20$ ($W_S = 1 - 0.50 - 0.30 = 0.20$).

Illustration 9.

Calculate expected return and standard deviation of the following two investments "A" and "B" exclusively and also if total investment is divided one half in each.

The economic predictions are —

Economic climate	Probability of Economic climate	Returns from A %	Returns from B %
Recession (R)	0.2	12	10
Stable (S)	0.5	15	16
Expansion (E)	0.3	20	12
	1.00		

Solution:

2. Investment A and B exclusively

Eco- nomic climate	Probability	% R_A	% R_B	P X R_A	P X R_B	$R_A - \bar{R}_A$	$R_B - \bar{R}_B$	$P(R_A - \bar{R}_A)^2$	$P(R_B - \bar{R}_B)^2$
R	0.2	12	10	2.40	2.0	-3.9	-3.6	3.04	2.59
S	0.5	15	16	7.50	8.0	-0.9	2.4	0.41	2.88
E	0.3	20	12	6.0	3.6	4.1	-1.6	5.04	0.77
				15.9%	13.6%			8.49	6.24

$$\bar{R}_A = 15.90\% \text{ \& } \bar{R}_B = 13.60$$

$$\text{Standard Deviation} = SD_A = \sqrt{8.49} = 2.91\% ; \text{Standard Deviation} = SD_B = \sqrt{6.24} = 2.50\%$$

2. One half in Portfolio A and One half in B

Economic climate	Probability P	Return R %	PR	$R - \bar{R}$	$P(R - \bar{R})^2$
R	0.2	$(12+10)/2 = 11$	2.20	-3.75	2.8125
S	0.5	$(15+16)/2 = 15.5$	7.75	0.75	0.2813
E	0.3	$(20+12)/2 = 16$	4.80	1.25	0.4688
			14.75		3.5626

$$\bar{R}_{AB} = 14.75\%$$

$$SD \text{ or } \sigma_{(A+B)} = \sqrt{3.5636} = 1.89\%$$

Hence, Expected return from the Portfolio is 14.75% and standard deviation of the Portfolio is 1.89%.

Illustration 10.

the following information, ascertain the risk of the portfolio —

Securities	Standard Deviation	Proportion in Portfolio
A	8%	0.30
B	12%	0.50
C	6%	0.20

Correlation Co-efficient

$$AB = 0.50$$

$$AC = -0.40$$

$$BC = +0.75$$

Solution:

1. Formula Approach (Alternative 1)

(a) Basic Values of Factors for Determination of Portfolio Risk

Standard Deviation of Security A	σ_A	8%
Standard Deviation of Security B	σ_B	12%
Standard Deviation of Security C	σ_C	6%
Correlation co-efficient of Securities A and B	ρ_{AB}	0.50
Correlation co-efficient of Securities A and C	ρ_{AC}	-0.40
Correlation co-efficient of Securities B and C	ρ_{BC}	0.75
Weight of Security A	W_A	0.30
Weight of Security B	W_B	0.50
Weight of Security C	W_C	0.20

(b) Computation of Portfolio Risk (σ_{ABC})

$$\begin{aligned}
 &= \sqrt{(\sigma_A^2 \times W_A^2) + (\sigma_B^2 \times W_B^2) + (\sigma_C^2 \times W_C^2) + 2(\sigma_A \times W_A \times \sigma_B \times W_B \times \rho_{AB}) + 2(\sigma_A \times W_A \times \sigma_C \times W_C \times \rho_{AC}) + 2(\sigma_B \times W_B \times \sigma_C \times W_C \times \rho_{BC})} \\
 &= \sqrt{(8^2 \times 0.3^2) + (12^2 \times 0.5^2) + (6^2 \times 0.2^2) + (2 \times 8 \times 0.3 \times 12 \times 0.5 \times 0.5) + (2 \times 8 \times 0.3 \times 6 \times 0.2 \times (-0.4)) + (2 \times 12 \times 0.5 \times 6 \times 0.2 \times 0.75)} \\
 &= \sqrt{(64 \times 0.09) + (144 \times 0.25) + (36 \times 0.04) + (36 \times 0.04) + (14.4) + (-2.304) + (10.8)} \\
 &= \sqrt{57.6 + 36 + 1.44 + 14.4 - 2.304 + 10.8} \\
 &= \sqrt{66.096} \\
 &= 8.13\%
 \end{aligned}$$

2. Matrix Approach (Alternative 2)

(a) Basic Values of Factors for Determination of Portfolio Risk

Variance of Security A	σ_A^2	$8^2 = 64$
Variance of Security B	σ_B^2	$12^2 = 144$
Variance of Security C	σ_C^2	$6^2 = 36$
Covariance of Securities A and B	$[\rho_{AB} \times \sigma_A \times \sigma_B]$	Cov_{AB}
Covariance of Securities A and C	$[\rho_{AC} \times \sigma_A \times \sigma_C]$	Cov_{AC}
Covariance of Securities B and C	$[\rho_{BC} \times \sigma_B \times \sigma_C]$	Cov_{BC}
Weight of Security A	W_A	0.30
Weight of Security B	W_B	0.50
Weight of Security C	W_C	0.20

(b) Matrix

Securities		A	B	C
	Weights	0.30 W_A	0.50 W_B	0.20 W_C
A	0.30 W_A	64 (σ_A^2)	48 (Cov_{AB})	-19.2 (Cov_{AC})
B	0.50 W_B	48 (Cov_{AB})	144 (σ_B^2)	54 (Cov_{BC})
C	0.20 W_C	-19.2 (Cov_{AC})	54 (Cov_{BC})	36 (σ_C^2)

(a) Computation of Portfolio Variance (σ_{ABC}^2)

	Description	Computation ($W \times W \times \text{Cov}$) or ($W \times W \times \sigma^2$)	Product
1	$W_A \times W_A \times \sigma_A^2$	$0.30 \times 0.30 \times 64$	5.76
2	$W_A \times W_B \times \text{COV}_{AB}$	$0.30 \times 0.50 \times 48$	7.20
3	$W_A \times W_C \times \text{COV}_{AC}$	$0.30 \times 0.20 \times (19.2)$	(1.15)

4	$W_B \times W_A \times COV_{AB}$	$0.50 \times 0.30 \times 48$	7.20
5	$W_B \times W_B \times \sigma_B^2$	$0.50 \times 0.50 \times 144$	36
6	$W_B \times W_C \times COV_{BC}$	$0.50 \times 0.20 \times 54$	5.40
7	$W_C \times W_A \times COV_{AC}$	$0.20 \times 0.30 \times (19.2)$	(1.15)
8	$W_C \times W_B \times COV_{BC}$	$0.20 \times 0.50 \times 54$	5.40
9	$W_C \times W_C \times \sigma_C^2$	$0.20 \times 0.20 \times 36$	1.44
Variance of the Portfolio (σ_{ABC})			66.10
Standard Deviation (Risk) of the Portfolio (σ_{ABC})			8.13%

Illustration 11.

From the following information, ascertain the risk of the portfolio —

Securities	Standard Deviation	Proportion in Portfolio
A	2%	0.30
B	10%	0.20
C	8%	0.20
D	12%	0.30

Correlation Co-efficient of pairs of different pairs of securities are

• AB - 0.60	• BC - 0.20
• AC 0.40	• BD - 0.50
• AD 0.30	• CD 0.60

Solution:

1. Basic Values of Factors for Determination of Portfolio Risk

Variance of Security A	σ_A^2	$2^2 = 4$
Variance of Security B	σ_B^2	$10^2 = 100$
Variance of Security C	σ_C^2	$8^2 = 64$
Variance of Security D	σ_D^2	$12^2 = 144$

Covariance of Securities A and B	$[\rho_{AB} \times \sigma_A \times \sigma_B]$	Cov_{AB}	$-0.60 \times 2 \times 10 = -12$
Covariance of Securities A and C	$[\rho_{AC} \times \sigma_A \times \sigma_C]$	Cov_{AC}	$0.40 \times 2 \times 8 = 6.4$
Covariance of Securities A and D	$[\rho_{AD} \times \sigma_A \times \sigma_D]$	Cov_{AD}	$0.30 \times 2 \times 12 = 7.2$
Covariance of Securities B and C	$[\rho_{BC} \times \sigma_B \times \sigma_C]$	Cov_{BC}	$-0.20 \times 10 \times 8 = -16$
Covariance of Securities B and D	$[\rho_{BD} \times \sigma_B \times \sigma_D]$	Cov_{BD}	$-0.50 \times 10 \times 12 = -60$
Covariance of Securities C and D	$[\rho_{CD} \times \sigma_C \times \sigma_D]$	Cov_{CD}	$0.60 \times 8 \times 12 = 57.6$

Weight of Security A	W_A	0.30
Weight of Security B	W_B	0.20
Weight of Security C	W_C	0.20
Weight of Security D	W_D	0.30

Matrix

		A	B	C	D
	Weights	$0.30 W_A$	$0.20 W_B$	$0.20 W_C$	$0.30 W_D$
A	$0.30 W_A$	4 (σA^2)	-12 (Cov_{AB})	6.4 (Cov_{AC})	7.2 (Cov_{AD})
B	$0.20 W_B$	-12 (Cov_{AB})	100 (σB^2)	-16 (Cov_{BC})	-60 (Cov_{BD})
C	$0.20 W_C$	6.4 (Cov_{AC})	-16 (Cov_{BC})	64 (σC^2)	57.6 (Cov_{CD})
D	$0.30 W_D$	7.2 (Cov_{AD})	-60 (Cov_{BD})	57.6 (Cov_{CD})	144 (σD^2)

2. Computation of Portfolio Variance (σ_{ABC}^2)

	Description	Computation ($W \times W \times Cov$) or ($W \times W \times \delta^2$)	Product
1	$W_A \times W_A \times \delta A^2$	$0.30 \times 0.30 \times 4$	0.36
2	$W_A \times W_B \times Cov_{AB}$	$0.30 \times 0.20 \times (12)$	(0.72)
3	$W_A \times W_C \times Cov_{AC}$	$0.30 \times 0.20 \times 6.4$	0.384
4	$W_A \times W_D \times Cov_{AD}$	$0.30 \times 0.30 \times 7.2$	0.648
5	$W_B \times W_A \times Cov_{AB}$	$0.20 \times 0.30 \times (12)$	(0.72)
6	$W_B \times W_B \times \delta B^2$	$0.20 \times 0.20 \times 100$	4.00
7	$W_B \times W_C \times Cov_{BC}$	$0.20 \times 0.20 \times (16)$	(0.64)
8	$W_B \times W_D \times Cov_{BD}$	$0.20 \times 0.30 \times (60)$	(3.60)
9	$W_C \times W_A \times Cov_{AC}$	$0.20 \times 0.30 \times 6.4$	0.384
10	$W_C \times W_B \times Cov_{BC}$	$0.20 \times 0.20 \times (16)$	(0.64)
11	$W_C \times W_C \times \delta C^2$	$0.20 \times 0.20 \times 64$	2.56
12	$W_C \times W_D \times COV_{CD}$	$0.20 \times 0.30 \times 57.6$	3.456
13	$W_D \times W_A \times Cov_{AD}$	$0.30 \times 0.30 \times 7.2$	0.648
14	$W_D \times W_B \times COV_{BD}$	$0.30 \times 0.20 \times (-60)$	(3.60)
15	$W_D \times W_C \times COV_{CD}$	$0.30 \times 0.10 \times 57.6$	3.456
16	$W_D \times W_D \times \delta D^2$	$0.30 \times 0.40 \times 144$	12.96
	Variance of the Portfolio (δ_{ABC}^2)		18.936
	Standard Deviation (Risk) of the Portfolio (δ_{ABCD})		4.35%

Illustration 12.

Aditi is interested to construct a portfolio of Securities M and N. She has collected the following information about the proposed investment.

	M	N
Expected return	20%	25%
σ	12%	16%

Co-efficient of Co-retention, r , between M and N is 16.

Aditi wants to constitute only five portfolios of M and N as follows.

- I. All funds invested in M.
- II. 50% of funds in each M and N.
- III. 75% of funds in M and 25% in N.
- IV. 25% of funds in M and 75% in N.
- V. All funds invested in N.

You are required to calculate—

- (1) Expected return under different portfolios,
- (2) Risk factor associated with these portfolios,
- (3) Which portfolio is best from the point of view of Risk.
- (4) Which portfolio is best from the point of view of Return.

Solution:

1. Expected Return under different Portfolios

Portfolio	M		N		Expected Return of Portfolio
	Probability	Return	Probability	Return	
I	1	0.20	0	0.25	$1 \times 0.20 + 0 \times 0.25 = 20\%$
II	0.5	0.20	0.5	0.25	$0.5 \times 0.20 + 0.5 \times 0.25 = 22.50\%$
III	0.75	0.20	0.25	0.25	$0.75 \times 0.20 + 0.25 \times 0.25 = 21.25\%$
IV	0.25	0.20	0.75	0.25	$0.25 \times 0.20 + 0.75 \times 0.25 = 23.75\%$
V	0	0.20	1	0.25	$0 \times 0.20 + 1 \times 0.25 = 25\%$

2. Risk factor associated with different Portfolios:

Portfolio	Computation	σ_{AB}
I	$= \sqrt{(\sigma_M^2 \times W_M^2) + (\sigma_N^2 \times W_N^2) + 2(\sigma_M \times W_M \times \sigma_N \times W_N \times \rho_{MN})}$ $= \sqrt{(12^2 \times 1^2) + (16^2 \times 0^2) + (2 \times 12 \times 1 \times 16 \times 0 \times 0.16)}$ $= \sqrt{144} = 12\%$	12%

II	$= \sqrt{(\sigma_M^2 \times W_M^2) + (\sigma_N^2 \times W_N^2) + 2(\sigma_M \times W_M \times \sigma_N \times W_N \times \rho_{MN})}$ $= \sqrt{(12^2 \times 0.50^2) + (16^2 \times 0.50^2) + (2 \times 12 \times 0.50 \times 16 \times 0.50 \times 0.16)}$ $= \sqrt{36 + 64 + 15.36} = \sqrt{115.36} = 10.74$	10.74%
III	$= \sqrt{(\sigma_M^2 \times W_M^2) + (\sigma_N^2 \times W_N^2) + 2(\sigma_M \times W_M \times \sigma_N \times W_N \times \rho_{MN})}$ $= \sqrt{(12^2 \times 0.75^2) + (16^2 \times 0.25^2) + (2 \times 12 \times 0.75 \times 16 \times 0.25 \times 0.16)}$ $= \sqrt{81 + 16 + 11.52} = \sqrt{108.52} = 10.42\%$	10.42%
IV	$= \sqrt{(\sigma_M^2 \times W_M^2) + (\sigma_N^2 \times W_N^2) + 2(\sigma_M \times W_M \times \sigma_N \times W_N \times \rho_{MN})}$ $= \sqrt{(12^2 \times 0.25^2) + (16^2 \times 0.75^2) + (2 \times 12 \times 0.25 \times 16 \times 0.75 \times 0.16)}$ $= \sqrt{9 + 144 + 11.52} = \sqrt{164.52} = 12.83\%$	12.83%
V	$= \sqrt{(\sigma_M^2 \times W_M^2) + (\sigma_N^2 \times W_N^2) + 2(\sigma_M \times W_M \times \sigma_N \times W_N \times \rho_{MN})}$ $= \sqrt{(12^2 \times 0^2) + (16^2 \times 1^2) + (2 \times 12 \times 0 \times 16 \times 1 \times 0.16)}$ $= \sqrt{256} = 16\%$	16%

3. Best Portfolio from the point of view of risk:

The Best Portfolio from the point of view of risk is the one which has the least risk factor i.e., 10.42%. Portfolio III [i.e., 75% of funds invested in M and 25% in N].

4. Best Portfolio from the point of return:

Portfolio V [i.e., 100% funds invested in the security, N] is the best from the point of return. This Portfolio will earn a return of 25%.

Illustration 13.

An investor holds two equity shares A and B in equal proportion with the following risk and return characteristics:

$E(R_A)$	28%
σ_A	30%
$E(R_B)$	24%
σ_B	26%

The returns of these securities have a positive correlation of 0.7. You are required to calculate the portfolio return and risk. Further, suppose that the investor wants to reduce the portfolio risk (σ_p) to 17 per cent. How much should the correlation coefficient be to bring the portfolio risk to the desired level?

Solution:

Basic Data

Notation	Particulars	Value
ρ_{MP}	Correlation co-efficient of Portfolio with market	0.7
σ_A	Standard Deviation of Share A	30%
σ_B	Standard Deviation of Share B	26%

σ_P	Risk of the Portfolio	17%
$E(R_A)$	Return of the equity share A	28%
$E(R_B)$	Return of the Equity Share B	24%

1. Computation of Expected Return

$$\begin{aligned}\text{Expected Return } [E(R_p)] &= \text{Proportion of A} \times E(R_A) + \text{Proportion of B} \times E(R_B) \\ &= 28(0.5) + 24(0.5) = 14 + 12 = 26\%\end{aligned}$$

2. Computation of Portfolio Risk

$$\begin{aligned}\sigma_P &= \sqrt{(\sigma_A^2 \times W_A^2) + (\sigma_B^2 \times W_B^2) + 2(\sigma_A \times W_A \times \sigma_B \times W_B \times \rho_{AB})} \\ &= \sqrt{(30^2 \times 0.50^2) + (26^2 \times 0.50^2) + (2 \times 30 \times 0.50 \times 26 \times 0.50 \times 0.70)} \\ &= \sqrt{225 + 169 + 273} = \sqrt{667} = 25.83\%\end{aligned}$$

3. Correlation Coefficient — efficient

If the investor desires the portfolio standard deviation to be 17 per cent, the correlation coefficient will be as computed below:

$$\begin{aligned}\sigma_P &= \sqrt{(\sigma_A^2 \times W_A^2) + (\sigma_B^2 \times W_B^2) + 2(\sigma_A \times W_A \times \sigma_B \times W_B \times \rho_{AB})} \\ &= \sqrt{(30^2 \times 0.50^2) + (26^2 \times 0.50^2) + (2 \times 30 \times 0.50 \times 26 \times 0.50 \times \text{Cor}_{AB})} \\ (17)^2 &= (30)^2(0.5)^2 + (26)^2(0.5)^2 + 2(0.5)(0.5)(30)(26) \text{Cor}_{AB} \\ 289 &= 225 + 169 + 390 \text{Cor}_{AB} \\ \text{Cor}_{AB} &= -105.25/390 = -0.269\end{aligned}$$

Illustration 14.

From the following information, ascertain the Market Price (λ) of Risk of the portfolio from the following information -

Market Return (R_m)	Standard Deviation on Market Return (σ_m)	Return on Government Bonds (R_f)	Standard Deviation of the Portfolio (σ_p)
18%	6%	6%	8%
20%	8%	7%	4%
22%	9%	8%	12%

Also, determine the expected return for each of the above cases.

Solution:

1. Formulae for Expected Return and Market Price of Risk

$$\text{Expected Return on Portfolio } R_p = R_f + \lambda \times \sigma_p$$

$$\text{Market Price of Risk of Portfolio } \lambda = (R_m - R_f) / \sigma_M$$

2. Expected Return and Market Price of Risk

Market Return (R_m)	Std. Deviation on Market Return (σ_m)	Return on Government Bonds (R_f)	Std. Deviation of Portfolio (σ_p)	Market Price of Risk (λ)	Expected Return (R_p) [$R_f + \lambda \times \sigma_p$]
(1)	(2)	(3)	(4)	(5) = [(1) - (3)] / (2)	(6) = (3) + (5)X(4)
18%	6%	6%	8%	$\frac{12}{6} = 2$ [(18-6)/6]	22% [6% + 2 x 8%]
20%	8%	7%	4%	$\frac{13}{8} = 1.625$ [(20-7)/8]	13.50% [7% + 1.625 x 4%]
22%	9%	8%	12%	$\frac{14}{9} = 1.556$ [(22-8)/9]	26.67% [8% + 1.556 x 12%]

Illustration 15.

X Co. Ltd., invested on 1.4.2010 in certain equity shares as below:

Name of Co.	No. of shares	Cost (₹)
D Ltd.	1,000 (₹ 10 each)	20,000
G Ltd.	500 (₹1 each)	1,500

In September, 2010, 10% dividend was paid out by D Ltd. and in October, 2010, 30% dividend paid out by G Ltd. On 31.3.2011 market quotations showed a value of ₹ 22 and ₹ 29 per share for D Ltd. and G Ltd. respectively.

On 1.4.2011, investment advisors indicate (a) that the dividends from D Ltd. and G Ltd. for the year ending 31.3.2012 are likely to be 20% and 35%, respectively and (b) that the probabilities of market quotations on 31.3.2012 are as below:

Probability factor	Price/ share of D Ltd.	Price/ share of G Ltd.
0.2	22	29
0.5	25	31
0.3	28	33

You are required to—

- Calculate the average return from the portfolio for the year ended 31.3.2011;
- Calculate the expected average return from the portfolio for the year 2011-12; and
- Advise X Co. Ltd., of the comparative risk in the two investments by calculating the standard deviation in each case.

Solution:**1. Calculation of return on Portfolio for 2010-2011 (Calculation in ₹ / share)**

Particulars	D	G
1. Market value by 31.03.11	22	29
2.. Cost of investment	20	30
3. Gain / loss	2	(1)



4. Dividend received during the year Capital gain / loss by 31.03.11	1	0.3
5. Yield [(3) + (4)]	3	(0.7)
6. % return [(5) ÷ (2)] x 100	15	(2.33)
7. Weight in the Portfolio [20 : 15]	57	43
Weighted average return = (57 x 15%) - (43 x- 2.33%) = 7.55%		

2. Calculation of Expected Return for 2011-12

Particulars	D	G
1. Expected dividend	2	0.35
2. Capital gain by 31.03.12		
• (22 x 0.2) + (25 x 0.5) + (28 x 0.3)-22 = (25.3-22)	3.3	
• (29 x 0.2) + (31 x 0.5) + (33 x 0.3)-29 = (31.2-29)		2.2
3. Yield[(1) + (2)]	5.3	2.55
4. Market value 01. 04.11	22	29
5. % return [(3) ÷ (4)]	24.09 %	8.79 %
6. Weight in Portfolio (1,000 x 22) : (500 x 29)	45	29
Weighted Average (Expected) Return = 13.38%		

3. Standard deviation D Ltd.

Expected Market Value	Expected Gain	Expected Dividend	Expected Yield	D [(4) -5.3]	D ²	Probability	PD ²
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
22	0	2	2	- 33	10.89	0.2	2.17
25	3	2	5	- 0.3	0.09	0.5	0.05
28	6	2	8	2.7	7.29	0.3	2.19
							4.41

Standard deviation = $\sqrt{PD^2} = \sqrt{4.41} = 2.1$

4. Standard deviation G Ltd.

Expected Market Value	Expected Gain	Expected Dividend	Expected Yield	D [(4) – 2.55]	D ²	Probability	PD ²
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
29	0	0.35	0.35	- 220	4.84	0.2	0.97
31	2	0.35	2.35	- 0.2	0.04	0.5	0.02
33	4	0.35	4.35	1.8	33.24	0.3	0.97
							1.96

Standard deviation = $\sqrt{PD^2} = \sqrt{1.96} = 1.4$

Share of company D Ltd. is more risky as the S.D. is more than company G Ltd.

Illustration 16.

The historical rates of return of two securities over the past ten years are given.

Calculate the Covariance and the Correlation coefficient of the two securities;

Years	1	2	3	4	5	6	7	8	9	10
Security A : (Return %)	12	8	7	14	16	15	18	20	16	22
Security B: (Return %)	20	22	24	18	15	20	24	25	24	18

Solution:

1. Computation of Factors

	Return of		Deviation from Mean		Variance of		Covariance of
Year	SecurityA (R ₁)	SecurityB (R ₂)	SA (R ₁ - $\overline{R_1}$) (D ₁)	SB (R ₂ - $\overline{R_2}$) (D ₂)	(D ₁ ²)	(D ₂ ²)	R ₁ & R ₂ [D ₁ X D ₂]
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	12	20	-2.8	-1	7.84	1	2.8
2	8	22	-6.8	1	46.24	1	-6.8
3	7	24	-7.8	3	60.84	9	-23.4
4	14	18	-0.8	-3	0.64	9	2.4
5	16	15	1.2	-6	1.44	36	-7.2
6	15	20	0.2	-1	0.04	1	-0.2
7	18	24	3.2	3	10.24	9	9.6
8	20	25	5.2	4	27.04	16	20.8
9	16	24	1.2	3	1.44	9	3.6
10	22	18	7.2	-3	51.84	9	-21.6
	ΣR ₁ =148	ΣR ₂ = 210			207.6	100	-20

	Security A	Security B
Mean	$\bar{R}_1 = \Sigma R_1 \div n$ $= 148 \div 10 = 14.8$	$\bar{R}_2 = \Sigma R_2 \div n$ $= 210 \div 10 = 21$
Variance	$\sigma_1^2 = \Sigma D_1^2 \div n = 207.6 / 10 = 20.76$	$\sigma_2^2 = \Sigma D_2^2 \div n = 100 / 10 = 10$
Standard Deviation	$\sigma_1 = \sqrt{20.76} = 4.55$	$\sigma_2 = \sqrt{10} = 3.162$

2. Covariance and Correlation:

Combination	Security A and B
Covariance	$\text{Cov}_{AB} = \Sigma [D_1 \times D_2] \div n = -20 \div 10 = -2$
Correlation	$\rho_{AB} = \text{Cov}_{AB} / (\sigma_A \times \sigma_B)$ $= -2 / (4.55 \times 3.162) = -0.1390$

Illustration 17.

The distribution of return of security "P" and the market portfolio "Q" is given below:

Probability	Return %	
	P	Q
0.30	30	-10
0.40	20	20
0.30	0	35

You are required to calculate the expected return of security "P" and the market portfolio "Q", the covariance between the market portfolio and security and beta for the security,

Solution:

1. Expected Return and Risks of Security P

Scenario	Probability (P)	Return (R)%	Expected Return %	Deviation (D)%	D ²	Variance (P x D ²)
(1)	(2)	(3)	(4) = (2) X (3)	(5) = (3) - 2X(4)	(6)	(7) = (2)X(6)
1	0.30	30	9	13	169	50.7
2	0.40	20	8	3	9	3.6
3	0.30	0	0	(17)	289	86.7
			17.00%			141

Expected Return on Security P = 17.00%

Risk on Security (P = $\sigma_P = \sqrt{\text{Variance}} = \sqrt{141} = 11.87\%$)

2. Expected Return and Risks of Market Portfolio Q

Scenario	Probability (P)	Return (R)%	Expected Return %	Deviation (D)%	D ²	Variance (P X D ²)
(1)	(2)	(3)	(4) = (2) X (3)	(5) = (3) - $\sum(4)$	(6)	(7) = (2)X(6)
1	0.30	(10)	(3)	(25.5)	650.25	195.075
2	0.40	20	8	4.5	20.25	8.1
3	0.30	35	10.5	19.5	380.25	114.07
			15.50%			317.245

Expected Return on Market Portfolio Q = 15.50%

Risk on Security (Q = $\sigma_Q = \sqrt{\text{Variance}} = \sqrt{317.24} = 17.81\%$)

3. Computation of Covariance of Securities P and Market Portfolio Q

Scenario	Probability (P)	Deviation (D_P) from Mean for P%	Deviation (D_Q) from Mean for Q%	Deviation Product (D_{PQ}) = $D_P \times D_Q$	Covariance ($P \times D_{PQ}$)
(1)	(2)	(3)	(4)	(5) = (3) x (4)	(6) = (2) x (5)
1	0.30	13	(25.5)	(331.5)	(99.45)
2	0.40	3	4.5	13.5	5.4
3	0.30	(17)	19.5	(331.5)	(99.45)
					(193.5)

Covariance of Securities P and Market Portfolio Q [Cov_{PQ}] = (193.5)

$$\text{Beta} = Cov_{PQ} \div \sigma_P^2 = -193.5 \div 317.245 = -0.6099$$

Illustration 18.

An investor estimates return on shares in two different companies under four different scenarios as under —

Scenario	Probability of its happening	Return on Security G	Return on Security H
1	0.20	12%	10%
2	0.30	15%	20%
3	0.40	19%	25%
4	0.10	25%	35%

- Ascertain expected rate of return if the investor invests all his funds in Security G alone, or in Security H alone?
- Determine the preferred security based on return?
- Ascertain the risk associated with each of the security?
- If the investor invests 40% in Security G & 60% in Security H, what is the expected return and the associated risk?

Solution:**1. Expected Return and Risks of Security G**

Scenario	Probability (P)	Return (R)	Expected Return	Deviation (D)	D^2	Variance ($P \times D^2$)
(1)	(2)	(3)	(4) = (2) X (3)	(5) = (3) -	(6)	(1) = (2) X (6)
1	0.20	12%	2.40%	(5%)	25	5.00
2	0.30	15%	4.50%	(2%)	4	1.20
3	0.40	19%	7.60%	2%	4	1.60
4	0.10	25%	2.50%	8%	64	6.40
			17.00%			14.20

Expected Return on Security G = 17.00%

$$\text{Risk on Security G} = \sigma_G = \sqrt{\text{Variance}} = \sqrt{14.20} = 3.77\%$$

2. Expected Return and Risks of Security H

Sce- nario	Probability (P)	Return (R)	Expected Return	Deviation (D)	D ²	Variance (P X D ²)
(1)	(2)	(3)	(4) = (2) x (3)	(5) = (3) -	(6)	(7) = (2) x (6)
1	0.20	10%	2.00%	(11.5%)	132.5	26.45
2	0.30	20%	6.00%	(1.5%)	2.25	0.675
3	0.40	25%	10.00%	3.5%	12.25	4.9
4	0.10	35%	3.50%	13.5%	182.25	18.22
			21.50%			50.24

Expected Return on Security H = 21.50%

Risk on Security H = $\sigma_H = \sqrt{\text{variance}} = \sqrt{50.24} = 7.08\%$

3. Computation of Covariance of Securities G and H

Sce- nario	Probability (P)	Deviation (D _G) from Mean for G	Deviation (D _H) from Mean for H	Deviation Product (D _p) = D _G X D _H	Covariance (P x D _p)
(1)	(2)	(3)	(4)	(5) = (3) x (4)	(6) = (2) x (5)
1	0.20	(5%)	(11.5%)	57.5	11.5
2	0.30	(2%)	(1.5%)	3	0.9
3	0.40	2%	3.5%	7	2.8
4	0.10	8%	13.5%	108	10.8
					26.00

Covariance of Securities G and H $\text{COV}_{GH} = 26.00$

4. Expected Risk/ Return on Portfolio of A and B [40% : 60% Ratio]

Basic Values of Factors for Determination of Portfolio Risk

Factors	Symbol	Value
Standard Deviation of Security G [WN 1]	δG	3.77%
Standard Deviation of Security H [WN 2]	δH	7.08%
Covariance between Securities G and H [WN 3]	Cov_{GH}	26.00
Correlation co- efficient of Securities G and H [See Note]	ρ_{GH}	0.9741
Weight of Security G	W_G	0.40
Weight of Security H	W_H	0.60

Note: Computation of Correlation Co-efficient of G and H

$\rho_{GH} = \text{Cov}_{GH} \div (\delta G \times \delta H) = 26.00 \div (3.77 \times 7.08) = 0.9741$

Alternative 1: Risk of Portfolio i.e. Standard Deviation of Portfolio of G and H [40% : 60% Ratio]

$$\sigma_{GH} = \sqrt{(\sigma_G^2 \times W_G^2) + (\sigma_H^2 \times W_H^2) + 2(\sigma_G \times W_G \times \sigma_H \times W_H \times \rho_{GH})}$$

$$\text{or} = [(\sigma_G^2 \times W_G^2) + (\sigma_H^2 \times W_H^2) + (2 \times \sigma_G \times W_G \times \sigma_H \times W_H \times \rho_{GH})]^{1/2}$$

$$= \sqrt{(3.77^2 \times 0.40^2) + (7.08^2 \times 0.60^2) + (2 \times 3.77 \times 0.40 \times 7.08 \times 0.60 \times 0.9741)}$$

$$= \sqrt{(14.21 \times 0.16) + (50.13 \times 0.36) + (12.48)}$$

$$\text{Risk} = \sqrt{2.27 + 20.09 + 13.48} = \sqrt{32.80} = 5.73\%$$

$$\text{Return} = 40\% \text{ of Return on G} + 60\% \text{ of Return on H} = 0.40 \times 17\% + 0.60 \times 21\% = 19.40\%$$

Illustration 19 .

A Study by a Mutual Fund has revealed the following data in respect of the three securities:

Security	σ (%)	Correlation with Index, ρ_{sm}
P	20	0.66
Q	18	0.95
R	12	0.75

The Standard Deviation of the Market Portfolio (BSE Sensex) is observed to be 18%.

1. What is the sensitivity of returns of each stock with respect to the market?
2. What are the Co-variances among the various stocks?
3. What would be the risk of portfolio consisting of all the three stocks equally?
4. What is the beta of the portfolio consisting of equal investment in each stock?
5. What is the total systematic and unsystematic risk of the portfolio in (4)?

Solution:

1. Sensitivity

Security	P	Q	R
Standard Deviation [A]	20.00	18.00	12.00
Correlation to Market Portfolio [B]	0.66	0.95	0.75
Beta (Sensitivity) = [A] X [B] / σ_M	0.73	0.95	0.50

2. Covariance between the securities

$$\text{Covariance of Returns between the securities P and Q} = \text{Cov}_{PQ} = \beta_P \times \beta_Q \times \sigma_M^2$$

Securities		P	Q	R
	Beta	0.73	0.95	0.50
P	0.73	—	$0.73 \times 0.95 \times 324$	$0.73 \times 0.50 \times 324$
Q	0.95	$0.73 \times 0.95 \times 324$	—	$0.50 \times 0.95 \times 324$
R	0.50	$0.73 \times 0.50 \times 324$	$0.50 \times 0.95 \times 324$	—

Covariance Between	Computation
P and Q	$\beta_P \times \beta_Q \times \sigma_M^2 = 0.73 \times 0.95 \times 324 = 224.69$
P and R	$\beta_P \times \beta_R \times \sigma_M^2 = 0.73 \times 0.50 \times 324 = 118.26$
Q and R	$\beta_Q \times \beta_R \times \sigma_M^2 = 0.95 \times 0.50 \times 324 = 153.90$

3. Risk of the Portfolio consisting of Equal Investment in each stock

Matrix

Securities		A	B	C
	Weights	1/3 W_P	1/3 W_Q	1/3 W_R
P	1/3 W_P	400 (σ_P^2)	224.69 (Cov_{PQ})	118.26 (Cov_{PR})
Q	1/3 W_Q	224.69 (Cov_{PQ})	324 (σ_Q^2)	153.90 (Cov_{QR})
R	1/3 W_R	118.26 (Cov_{PR})	153.90 (Cov_{QR})	144 (σ_R^2)

Computation of Portfolio Variance (σ_{PQR}^2)

	Description	Computation ($W \times W \times \text{Cov}$) or ($W \times W \times \sigma^2$)	Product
1	$W_P \times W_P \times \sigma_P^2$	$1/3 \times 1/3 \times 400$	44.44
2	$W_P \times W_Q \times \text{Cov}_{PQ}$	$1/3 \times 1/3 \times 224.69$	24.97
3	$W_P \times W_R \times \text{Cov}_{PR}$	$1/3 \times 1/3 \times 118.26$	13.14
4	$W_Q \times W_P \times \text{Cov}_{PQ}$	$1/3 \times 1/3 \times 224.69$	24.97
5	$W_Q \times W_Q \times \sigma_Q^2$	$1/3 \times 1/3 \times 324$	36.00
6	$W_Q \times W_R \times \text{Cov}_{QR}$	$1/3 \times 1/3 \times 153.90$	17.10
7	$W_R \times W_P \times \text{Cov}_{PR}$	$1/3 \times 1/3 \times 118.26$	13.14
8	$W_R \times W_Q \times \text{Cov}_{QR}$	$1/3 \times 1/3 \times 153.90$	17.10
9	$W_R \times W_R \times \sigma_R^2$	$1/3 \times 1/3 \times 144$	16
	Variance of the Portfolio (σ_{PQR}^2)		206.86
	Standard Deviation (Risk) of the Portfolio (σ_{PQR})		14%

4. Beta of the Portfolio consisting of equal investment in each stock

Security	P	Q	R
a) Beta	0.73	0.95	0.50
b) Weight	1/3	1/3	1/3
c) Product	0.243	0.317	0.167

Portfolio Beta = $0.243 + 0.317 + 0.167 = 0.727$

5. Systematic and Unsystematic Risk of the Portfolio

Total Risk = Systematic Risk + Unsystematic Risk

Variance Approach - Total Risk of the Portfolio = Variance of the Portfolio = 206.86

Systematic Risk = $\beta_P^2 \times \sigma_M^2 = 0.727 \times 0.727 \times 324 = 171.24$

Unsystematic Risk = $206.86 - 171.24 = 35.62$

Illustration 20.

Given below is information of market rates Returns and Data from two Companies P and Q.

	Year 2011	Year 2012	Year 2013
Market (%)	11.0	13.0	6.0
Company P (%)	13.0	11.5	9.8
Company Q (%)	11.0	10.5	9.5

Determine the beta coefficients of the Shares of Company P and Company Q.

Solution:

1. Computation of Factors

Year	Return of			Deviation from Mean			Variance of			Covariance of		
	Mkt. (R_M)	P (R_P)	Q (R_Q)	Mkt. ($R_M - \bar{R}_M$) (D_M)	P ($R_P - \bar{R}_P$) (D_P)	Q ($R_Q - \bar{R}_Q$) (D_Q)	Mkt. (D_M^2)	Mkt. (D_P^2)	Mkt. (D_Q^2)	R_M & R_P [$D_M \times D_P$]	R_M & R_Q [$D_M \times D_Q$]	R_P & R_Q [$D_P \times D_Q$]
(1)	(2)	(3)	(4)	(5) = (2)-10	(6) = (3)-11.43	(7) = (4)-10.33	(8) (5) ²	(9) (6) ²	(10) (7) ²	(11) (5)×(6)	(12) (5)×(7)	(13) (6)×(7)
2011	11	13.0	11.0	1	1.57	0.67	1	2.46	0.45	1.57	0.67	1.05
2012	13	11.5	10.5	3	0.07	0.17	9	0.005	0.03	0.21	0.51	0.01
2013	6	9.8	9.5	-4	-1.63	-0.83	16	2.66	0.69	6.52	3.32	1.35
	30	34.3	31				26	5.125	1.17	8.30	4.50	2.41

	Market Portfolio	Shares of Company P	Shares of Company Q
Mean	$\bar{R}_M = \sum R_M \div n$ $= 30 \div 3$ $= 10$	$\bar{R}_P = \sum R_P \div n$ $= 34.3 \div 3$ $= 11.43$	$\bar{R}_Q = \sum R_Q \div n$ $= 31 \div 3$ $= 10.33$
Variance	$\sigma_M^2 = \sum D_M^2 \div n$ $= 26 \div 3 = 8.67$	$\sigma_P^2 = \sum D_P^2 \div n$ $= 5.125 \div 3 = 1.71$	$\sigma_Q^2 = \sum D_Q^2 \div n$ $= 1.17 \div 3 = 0.39$
Standard Deviation	$\sigma_M = \sqrt{8.67} = 2.94$	$\sigma_P = \sqrt{1.71} = 1.31$	$\sigma_Q = \sqrt{0.39} = 0.62$

Combination	Market and P	Market and Q	P and Q
Covariance	$\text{Cov}_{MP} = \sum [D_M \times D_P] \div n$ $= 8.30 \div 3$ $= 2.77$	$\text{Cov}_{MQ} = \sum [D_M \times D_Q] \div n$ $= 4.50 \div 3$ $= 1.50$	$\text{Cov}_{PQ} = \sum [D_P \times D_Q] \div n$ $= 2.41 \div 3$ $= 0.80$

2. Computation of Beta

(a) Security P $\beta_P = \text{Cov}_{MP} \div \sigma_M^2 = 2.77 \div 8.67 = 0.32$

(b) Security Q $\beta_Q = \text{Cov}_{MQ} \div \sigma_M^2 = 1.5 \div 8.67 = 0.17$

Illustration 21.

The rates of return on the Security of Company A and Market portfolio for 10 periods are given below:

Period	Return of Security A (%)	Return on Market portfolio (%)
1	18	22
2	20	20
3	24	18
4	26	16
5	18	20
6	-5	8
7	17	-6
8	19	5
9	-7	6
10	20	11

(a) What is the beta of Security A?

(b) What is the characteristic line for security A?

Solution:

1. Computation of Beta of Security

Period	Return of		Deviation from Mean		Variance of		Covariance of
	Mkt. (R_M)	A (R_A)	Mkt. ($R_M - \bar{R}_M$) (D_M)	A ($R_A - \bar{R}_A$) (D_A)	Mkt. (D_M^2)	A (D_A^2)	R_M & R_A ($D_M \times D_A$)
(1)	(2)	(3)	(4) [(2)-12]	(5) [(3)-15]	(6) (4) ²	(7) (5) ²	(8) (4) × (5)
1	22	18	10	3	100	9	30
2	20	20	8	5	64	25	40
3	18	24	6	9	36	81	54
4	16	26	4	11	16	121	44
5	20	18	8	3	64	9	24
6	8	-5	-4	-20	16	400	80
7	-6	17	-18	2	324	4	-36

8	5	19	-7	4	49	16	-28
9	6	-7	-6	-22	36	484	132
10	11	20	-1	5	1	25	-5
	120	150			706	1174	335

	Market Portfolio	Shares of Company A
Mean	$\bar{R}_M = \sum R_M \div n$ $= 120 \div 10$ $= 12$	$\bar{R}_A = \sum R_A \div n$ $= 150 \div 10$ $= 15$
Variance	$\sigma_M^2 = \sum D_M^2 \div n$ $= 706/10 = 70.6$	$\sigma_A^2 = \sum D_A^2 \div n$ $= 1174 \div 10 = 117.4$
Standard Deviation	$\sigma_M = \sqrt{70.6} = 8.40$	$\sigma_A = \sqrt{117.4} = 10.84$

Covariance and Correlation:

Combination	Market and A
Covariance	$\text{Cov}_{MA} = \sum [D_M \times D_A] \div n$ $= 335 \div 10 = 33.5$
Beta β	$\beta = \text{Cov}_{MA} \div \sigma_M^2$ $= 33.5 \div 70.6 = 0.4745$

2. Computation of Characteristic Line for Security A

Particulars	Value
$y = \bar{R}_A$	15
β	0.4745
$x = \bar{R}_M$ (Expected Return on Market Index)	12

Characteristic Line for Security A = $y = \alpha + \beta x$,

$$15 = \alpha + 0.4745 \times 12$$

$$\alpha = 15 - (0.4745 \times 12) = 9.306\%$$

Characteristic line for Security A = $9.306 + 0.4745 R_M$

Note: It is assumed that rates of return for market portfolio and the security given in the question are returns in excess of risk free rate of return.

Illustration 22.

From the following information pertaining to returns of Security D and the Market for the past 4 Years, ascertain the value of Beta (β) of Security D —

Year	1	2	3	4
Security D	14%	15%	18%	22%
Market	9%	12%	15%	18%

Solution:

1. Approach I

$$\text{Beta } \beta = \frac{\sum R_M R_D - n \bar{R}_M \bar{R}_D}{\sum R_M^2 - n \bar{R}_M^2}$$

Market Return (R_M)	Return of Security D (R_D)	Product ($R_M \times R_D$)	R_M^2
9	14	9 x 14 = 126	9 ² = 81
12	15	12 x 15 = 180	12 ² = 144
15	18	15 x 18 = 270	15 ² = 225
18	22	18 x 22 = 396	18 ² = 324
54	69	972	774

n = 4 (No. of pairs considered for Beta, generally the no. of years)

$$\sum R_M R_D = 972 \text{ (Aggregate of Product)}$$

$$\sum R_M^2 = 774 \text{ (Aggregate of Return Square)}$$

$$\bar{R}_M = 13.5 \text{ (Mean of Market Return = Aggregate of Market Returns 54 / No. of Years 4)}$$

$$\bar{R}_D = 17.25 \text{ (Mean of Security A Return = Aggregate of Security D Returns 69 / No. of Years 4)}$$

$$\begin{aligned} \text{Therefore } \beta &= [972 - (4 \times 13.5 \times 17.25)] / [774 - (4 \times 13.5^2)] \\ &= [972 - 931.5] / [774 - 729] = 40.5 / 45 = 0.90 \end{aligned}$$

2. Approach II

$$\text{Beta } \beta = \text{Cov}_{MD} \div \text{Variance of } M = \text{Cov}_{MD} \div \sigma_M^2$$

Market Return (R_M)	Return of Security D (R_D)	Deviation of Market Return R_M from $\bar{R}_M$ (D_M)	Deviation of Security D Return R_D from $\bar{R}_D$ (D_D)	Variance of Market Return (D_M^2)	Covariance of R_M and R_D [Cov_{MD}] [$D_M \times D_D$]
(1)	(2)	(3) = (1) - 13.5	(4) = (2) - 17.25	(5)	(6) = (3) x (4)
9	14	(4.5)	(3.25)	20.25	(4.5) x (3.25) = 14.625
12	15	(1.5)	(2.25)	2.25	(1.5) x (2.25) = 3.375
15	18	1.5	0.75	2.25	1.5 x 0.75 = 1.125
18	22	4.5	4.75	20.25	4.5 x 4.75 = 21.375
54	69			45	40.5

Therefore, Beta $\beta = 40.5 \div 45 = 0.90$

Illustration 23.

An investor is seeking the price to pay for a security, whose standard deviation is 5.00%. The correlation coefficient for the security with the market is 0.80 and the market standard deviation is 4.40%. The return from Government securities is 5.20% and from the market portfolio is 9.80%.

The investor knows that, by calculating the required return, he can then determine the price to pay for the security. What is the required return on security?

Solution:

1. Computation of Beta Co-efficient

$$\text{Beta, } \beta = \rho_{SM} \times \frac{\sigma_S}{\sigma_M}$$

Where, ρ_{SM} = Correlation co-efficient between Security (S) and the Market (M).

σ_S = Standard Deviation of the Security Return

σ_M = Standard Deviation of the Market Return

$$\beta = 0.80 \times (5.00/4.40) = 0.909$$

2. Computation of Required Rate of Return (Based on CAPM)

$$\text{Expected Return} = R_F + \beta \text{ of Security X } (R_M - R_F)$$

$$R_F = \text{Risk Free Return} = 5.20\%$$

$$\beta = \text{Beta of Security} = 0.909$$

$$R_M = \text{Return on Market Portfolio} = 9.80\%$$

$$\text{Expected Return} = 5.20\% + 0.909 \times (9.80\% - 5.20\%) = 9.38\%$$

Illustration 24.

Investor's Weekly, a news magazine on the happenings at Cloudy Street, publishes the following information in its July edition for Security D - Equilibrium Return = 20%, Market Portfolio Return = 20%, 6% Treasury Bills (₹100) at ₹120. Covariance of the Security with the market portfolio is 225% and correlation is 0.85. Determine risk (o of Market Portfolio) and security risk.

Solution:

1. Computation of Beta of the Security:

(a) Computation of Risk Free Return

$$\begin{aligned} \text{Risk Free Rate} &= \text{Coupon Payment} \div \text{Current Market Price} \\ &= [\text{₹}100 \times 6\%] \div \text{₹}120 = \text{₹}6 \div \text{₹}120 = 5\% \end{aligned}$$

(b) Computation of Beta

Assuming Equilibrium Return = CAPM Return,

$$20\% = R_F + \beta_D \times (R_M - R_F)$$

$$\text{Or, } 20\% = 5\% + \beta_D \times (20\% - 5\%)$$

$$\text{Or, } \beta_D = 1$$

2. Computation of Market Risk

$$\beta_D = \frac{\text{COV}_{DM}}{\sigma_M^2}$$

$$\text{Or, } 1 = 225\% \div \sigma_M^2$$

$$\text{Or, } \sigma_M = 15\% \text{ (market risk)}$$

3. Computation of Security Risk

$$\beta_D = \frac{\sigma_D}{\sigma_M} \times \rho_{DM}$$

$$\text{Or, } 1 = [\sigma_D / 15\%] \times 0.85$$

$$\text{Or, } \sigma_D = 15\% \div 0.85 = 17.65\%$$

Illustration 25.

- (a) Calculate the market sensitivity index, and the expected return on the Portfolio from the following data;

Standard deviation of an asset	4.5%
Market standard deviation	4.0%
Risk - free rate of return	15.0%
Expected return on market Portfolio	17.0%
Correlation coefficient of Portfolio with market	0.89

- (b) What will be the expected return on the Portfolio? If Portfolio beta is 0.5 and the risk free return is 10%.

Solution:

(1) Basic Data for computation of Expected Return

Notation	Particulars	Case (a)	Case(b)
σ_P	Standard Deviation of asset	4.5%	4.5%
σ_M	Market Standard Deviation	4.0%	4.0%
ρ_{MP}	Correlation co-efficient of portfolio with market	0.89	0.89
R_F	Risk free rate of return	15%	10%
R_M	Expected return on market Portfolio	17%	17%
β_P	Portfolio Beta	To be ascertained	0.5

(2) Computation of Expected Return

	Case (a)	Case (b)
Portfolio Beta $\beta_P = \sigma_P \div \sigma_M \times \rho_{MP}$	$4.5 \div 4 \times 0.89 = 1.001$	0.5
Exacted Return $= R_F + \beta_P \times (R_M - R_F)$	$0.15 + [1.001 \times (0.17 - 0.15)] = 17.002\%$	$0.10 + [0.5 \times (0.17 - 0.10)] = 13.5\%$

Illustration 26.

The returns on Stock B and Market Portfolio for a period of 6 Years are as follows —

Year	Return on B (%)	Return on Market Portfolio
1	12	8
2	15	12
3	11	11
4	2	-4
5	19	11
6	-10	-2

You are required to determine —

- Characteristic line for Stock B
- The systematic and unsystematic risk of Stock B.

Solution:

1. Computation of Beta of Security

Period	Return of		Deviation from Mean		Variance of		Covariance of
	Mkt. (R_M)	B (R_B)	Mkt. ($R_M - \bar{R}_M$) (D_M)	B ($R_B - \bar{R}_B$) (D_B)	Mkt. (D_M^2)	S (D_B^2)	R_M & R_B [$D_M \times D_B$]
(1)	(2)	(3)	(4) [(2) - 6.00]	(5) [(3) - 7.00]	(6) (4) ²	(7) (5) ²	(8) (4) × (5)
1	8	12	2	5	4	25	10
2	12	15	4	8	16	64	32
3	11	11	5	4	25	16	20
4	-4	2	(10)	(5)	100	25	50
5	11	19	5	12	25	144	60
6	-2	-10	(8)	(17)	64	289	136
	36	49			234	563	308

	Market Portfolio	Shares of Company (B)
Mean	$\bar{R}_M = \sum R_M \div n$ $= 36 \div 6$ $= 6$	$\bar{R}_B = \sum R_B \div n$ $= 49 \div 6$ $= 8.17$
Variance	$\sigma_M^2 = \sum D_M^2 \div n$ $= 234/6 = 39$	$\sigma_B^2 = \sum D_B^2 \div n$ $= 563/6 = 93.83$
Standard Deviation	$\sigma_M = \sqrt{39} = 6.24$	$\sigma_B = \sqrt{93.83} = 9.69$

Covariance and Correlation:

Combination	Market and Security B
Covariance	$\text{Cov}_{MB} = \sum [D_M \times D_B] \div n$ $= 308 \div 6 = 51.33$
Beta β	$\beta = \text{Cov}_{MB} \div \sigma_M^2$ $= 51.33 \div 39 = 1.32$
Correlation	$\rho_{MB} = \frac{\text{Cov}_{MB}}{\sigma_M \times \sigma_B} = \frac{51.33}{6.24 \times 9.69} = 0.8489$

2. Computation of Characteristic Line for Security B

Particulars	Value
$y = \bar{R}_B$	8.17
β	1.32
$x = \bar{R}_M$ (Expected Return on Market Index)	6

Characteristic Line for Security B = $y = \alpha + \beta x$,

$$8.17 = \alpha + 1.32 \times 6$$

$$\alpha = 8.17 - 7.92 = 0.25$$

Characteristic line for Security $y = 0.25 + 1.32x$

3. Analysis of Risk into Systematic Risk and Unsystematic Risk

Particulars	Variance Approach	Standard Deviation Approach
Total Risk	66.75%	8.17%
Systematic Risk	$\text{Total risk} \times \rho_{MA}^2$ $= 66.75 \times 0.8489^2 = 48.102\%$	$\text{Total risk} \times \rho_{MA}$ $= 9.69 \times 0.8489 = 8.23\%$
Unsystematic Risk	$\text{Total risk} \times (1 - \rho_{MB}^2)$ $= 66.75 \times (1 - 0.8489^2) = 18.6479$	$\text{Total risk} \times (1 - \rho_{MB})$ $= 9.69 \times (1 - 0.8489) = 1.4642$

Illustration 27.

The Beta Co-efficient of Moon Light Ltd is 1.40. The Company has been maintaining 8% rate of growth in dividends and earnings. The last dividend paid was ₹4 per share. Return on Government Securities is 12%. Return on Market Portfolio is 18%. The Current Market Price of one share of Moon Light Ltd is ₹32.00.

Required —

- What will be the equilibrium price per share of Moon Light Ltd?
- Would you advise purchasing the share?

Solution:

1. Required Rate of Return on Shares of Moon Light Ltd

(Based on Capital Asset Pricing Model)

$$\text{Expected Return} = R_f + \beta \text{ of Security X } (R_m - R_f)$$

$$R_f = \text{Risk Free Return} = 12\%$$

β = Beta of Security (Target Ltd) = 1.40

R_m = Return on Market Portfolio = 18%

Expected Return = $12\% + 1.40 \times (18\% - 12\%) = 20.4\%$

2. Expected Market Price of Shares of Moon Light Ltd

(Based on Dividend Growth Model)

Expected Return = $D_1/P_0 + G$

D_1 = Dividend at end of Year 1 = Last Years Dividend $\times$ (1 + Growth Rate)

= ₹ 4 $\times$ (1 + 8%) = ₹ 4 $\times$ 1.08 = ₹ 4.32

P_0 = Price at Year Beginning = **To be determined (Expected Price)**

G = Growth Rate in Dividends

20.4 = (₹4.32 $\div$ Expected Price) + Growth rate of 8%

Or, 20.4% - 8% = ₹4.32 $\div$ Expected Price

Or, Expected Price = ₹4.32 $\div$ 12.4 = ₹34.83

3. Evaluation of Shares of Moon Light Ltd

Actual Market Price ₹32.00

Expected Market Price ₹34.83

Inference Shares of Moon Light Ltd. is underpriced.

Decision Moon Light Ltd. should be purchased.

Illustration 28.

The risk free return is 8 per cent and the return on market portfolio is 14 per cent. If the last dividend on Share 'A' was ₹2.00 and assuming that its dividend and earnings are expected to grow at the constant rate of 5 per cent. The beta of share 'A' is 2.50. Compute the intrinsic value of share A.

Solution:

Basic Data

Notation	Particulars	Value
β_A	Beta of Share	2.5
R_M	Market Return	14%
R_F	Risk Free Rate of Return	8%
R	Growth rate of Dividends	5%
D_0	Last Year's dividend	₹2

1. Computation of Expected Return

Expected Return $[E(R_A)] = R_F + [\beta_A \times (R_M - R_F)]$

= $0.08 + [2.5 \times (0.14 - 0.08)]$

= $0.08 + 2.5 (0.14 - 0.08) = 0.08 + 0.15 = 0.23$

i.e., $K_e = 23\%$

2. Intrinsic Value of share = $D_1 \div (K_e - g) = D_0 \times (1 + g) \div (K_e - g)$

= $2 \times (1 + 0.05) \div (0.23 - 0.05) = ₹ 11.67$

The Intrinsic Value of share A is ₹ 11.67.

Illustration 29.

An investor is holding 1,000 shares of Dream Land Company. Presently the dividend being paid by the company is ₹2 per share and the share is being sold at ₹25 per share in the market.

However several factors are likely to change during the course of the year as indicated below —

	Risk Free Rate	Market Risk Premium	Beta Value	Expected Growth Rate
Existing	12%	6%	1.6	5%
Revised	10%	4%	1.45	9%

In view of the above factors whether the investor should buy, hold or sell the shares? Why?

Solution:

Particulars	Existing	Revised
Rate of Return = $R_f + \beta (R_m - R_f)$	$= 12\% + 1.6 \times (6\%) = 21.6\%$	$= 10\% + 1.45 \times (4\%) = 15.8\%$
Price of Share $P_0 = \frac{D(1+g)}{K_e - g}$	$= \frac{2 \times (1.05)}{0.216 - 0.05} = \frac{2.10}{0.166} = 12.65$	$= \frac{2 \times (1.09)}{0.158 - 0.09} = \frac{2.18}{0.068} = 32.06$
Current Market Price	₹25	₹25
Inference	Over-Priced	Under-Priced
Decision	Sell	Buy

Illustration 30.

An investor holds two stocks X and Y. An analyst prepared ex-ante probability distribution for the possible Economic scenarios and the conditional returns for the two stocks and the market index as shown below:

Economic Scenario	Probability	Conditional Returns %		
		X	Y	Market
Growth	0.40	25	20	18
Stagnation	0.30	10	15	13
Recession	0.30	-5	-8	-3

The risk free rate during the next year is expected to be around 9%. Determine whether the investor should liquidate his holdings in stocks X and Y or on the contrary make fresh investments in them. CAPM assumptions are holding true.

Solution:

1. Computation of Expected Returns

Scenario	Prob. P	Return X R_x	Mean $P \times R_x$	Return Y R_y	Mean $P \times R_y$	Market Return R_m	Mean $P \times R_m$
Growth	0.4	25	10	20	8.0	18	7.2
Stagnation	0.3	10	3	15	4.5	13	3.9
Recession	0.3	-5	-1.5	-8	-2.4	-3	-0.9
Estimated Returns			11.5		10.1		10.2

2. Computation of Standard Deviation of R_M

R_M	$D_M = R_M - 10.2$	D_M^2	P	$P D_M^2$
18	7.8	60.84	0.4	24.34
13	2.8	7.84	0.3	2.35
-3	-13.2	174.24	0.3	52.27
Market Variance				78.96

Standard Deviation of the Market = $\sqrt{78.96} = 8.89\%$

3. Computation of Standard Deviation and Covariance of R_X

R_X	$D_X = R_X - 11.5$	D_X^2	P	$P D_X^2$	$D_X \times D_M$	$P D_X \times D_M$
25	13.5	182.25	0.4	72.900	105.3	42.12
10	-1.5	2.25	0.3	0.675	-4.2	-1.26
-5	-16.5	272.25	0.3	8.675	217.8	65.34
				155.25		106.20

Standard Deviation of Security X = $\sqrt{155.25} = 12.46\%$

Covariance with the market = 106.20

4. Computation of Standard Deviation and Covariance of R_Y

R_Y	$D_Y = R_Y - 10.1$	D_Y^2	P	$P D_Y^2$	$D_Y \times D_M$	$P D_Y \times D_M$
20	9.9	98.01	0.4	39.204	77.22	30.89
15	4.9	24.01	0.3	7.203	13.72	4.12
-8	-18.1	327.61	0.3	98.283	238.92	71.68
				144.69		106.69

Standard Deviation of Security Y = $\sqrt{144.69} = 12.03\%$

Covariance with the market = 106.69

5. Computation of CAPM Return**A. Beta = Covariance / Variance of the Market**

1. Beta of Security X = $106.20 / 78.96 = 1.34$

2. Beta of Security Y = $106.68 / 78.96 = 1.35$

B. Under CAPM, Equilibrium Return = $R_f + \beta (R_m - R_f)$

Expected Return of Security X = $9\% + 1.34 (10.2 - 9) = 10.61\%$

Expected Return of Security Y = $9\% + 1.35 (10.2 - 9) = 10.62\%$

6. Conclusion and Recommendation

Particulars	Security X	Security Y
Estimated Returns	11.50	10.10
Expected Return under CAPM	10.61	10.62
Estimated Return vs. Expected Returns	Expected Return is Lower. Stock X is underpriced.	Expected Return is Higher. Stock Y is underpriced.
Recommendation	Buy / Hold	Sell

**Illustration 31.**

Sanjiv is contemplating buying / selling the shares of Companies M, N and O. He already holds some shares in each of these Companies. He has the following data in his hand to aid him in his decision —

- Return on NIFTY 16%
- ₹ 500 Treasury Bonds, whose returns are considered risk free, earns its owners a return of ₹35
- Company M has a Beta Factor of 0.95 and investment therein yields a return of 13.5%
- Company N, which is traded at ₹1,200 per shares, earns its investors a sum of ₹246. It has a beta factor of 1.5.
- Company O, price of which is ₹450 has a beta factor of 0.6. Historical data shows that annual share price increase of the Company is around 8%. Last dividend declared was ₹12 per share. Dividend payout is expected to double in the next year.

Sanjiv seeks your guidance on the course of action.

Solution:**1. Market Return (R_M) and Risk Free Return (R_F)**

(a) Market Return = Return on NIFTY = 16%

(b) Risk Free Return = Return on Treasury Bonds = Return in ₹/Face Value = ₹35/₹500 = 7%

2. Evaluation of Company M

Particulars	Value
Estimated Return (Given) (R_M) [A]	13.5%
Expected Return under CAPM [$E(R_M)$] $E(R_M) = R_F + \beta_M \times (R_M - R_F) = 7\% + 0.95 \times (16\% - 7\%)$ [B]	15.55%
Estimated Return [A] vs. Expected Return under CAPM [B]	[B] is Higher
Inference	Stock gives lesser than what it should give
Conclusion [Expected Return is higher than Estimated Return] Share is	Overpriced
Recommendation	SELL

3. Evaluation of Company N

Particulars	Value
Estimated Return (Given)	₹246
Market Price (Given)	₹1200
Estimated Return (in %) (R_N) [Estimated Return ₹246/Market Price ₹1200] [A]	20.50%
Expected Return under CAPM [$E(R_N)$] $E(R_N) = R_F + \beta_N \times (R_M - R_F) = 7\% + 1.50 \times (16\% - 7\%)$ [B]	20.50%
Estimated Return [A] vs. Expected Return under CAPM [B]	Equal
Inference	Stock is giving exactly what it should give

Conclusion [Expected Return is EQUAL than Estimated Return] Share is	Correctly priced
Recommendation	HOLD

4. Evaluation of Company O

Particulars	Value
Capital Appreciation Expected (Market Price of ₹450 x 8%)	₹36
Estimated Dividend Payout (Previous Year's Dividend of ₹12 x 2 Times)	₹24
Total Estimated Return for the year	₹60
Estimated Return (in %) (R_O) [Estimated Return ₹60/Market Price ₹450] [A]	13.33%
Estimated Return under CAPM [$E(R_B)$] $E(R_O) = R_F + \beta_O \times (R_M - R_F) = 7\% + 0.60 \times (16\% - 7\%)$ [B]	12.40%
Estimated Return [A] vs. Expected Return under CAPM [B]	[B] is lower
Inference	Stock gives more than what it should give
Conclusion [Expected Return is LOWER than Estimated Return] Share is	Underpriced
Recommendation	BUY

Illustration 32.

Good Luck Ltd., has been enjoying a substantial net cash inflow, and until the surplus funds are needed to meet tax and dividend payments, and to finance further capital expenditure in several months time, they have been invested in a small portfolio of short-term equity investments.

Details of the portfolio, which consists of shares in four UK listed companies, are as follows.

Company	Number of shares held	Beta equity coefficient	Market price per share (₹)	Latest Dividend yield (%)	Expected return on equity in the next year %
A Ltd.	60,000	1.20	4.29	6.10	19.50
B Ltd.	80,000	2.30	2.92	3.40	24.00
C Ltd.	1,00,000	0.85	2.17	5.70	17.50
D Ltd.	1,25,000	1.28	3.14	3.30	23.00

The current market return is 19% a year and the Risk free rate is 11% a year.

Required:

- On the basis of the data given, calculate the risk of Good Luck Ltd's short term investment portfolio relative to that of the market.
- Recommend, with reasons, whether Good Luck Ltd., should change the composition of its portfolio.

Solution:

(1) Computation of Weighed Beta

Security	No. of shares held	MPS (₹)	Market value of investments	Proportion	Beta	Portfolio Beta
[1]	[2]	[3]	[4]	[5]	[6]	[7] = [5] x [6]

A	60,000	4.29	2,57,400	$2,57,400 \div 11,00,500 = 0.2339$	1.20	0.28068
B	80,000	2.92	2,33,600	$2,33,600 \div 11,00,500 = 0.2123$	2.30	0.48829
C	1,00,000	2.17	2,17,000	$2,17,000 \div 11,00,500 = 0.1972$	0.85	0.16762
D	1,25,000	3.14	3,92,500	$3,92,500 \div 11,00,500 = 0.3567$	1.28	0.45658
			11,00,500	1	5.63	1.393166

(2) Comparison with Return under CAPM and Recommended changes in Composition

Security	Valuation under CAPM $= R_F + [\beta \times (R_M - R_F)]$	Expected K_e in the next year %	Evaluation	Strategy
A	$11\% + 1.20 (19\% - 11\%) = 20.60$	19.50	Overpriced	Sell
B	$11\% + 2.30 (19\% - 11\%) = 29.40$	24.00	Overpriced	Sell
C	$11\% + 0.85 (19\% - 11\%) = 17.80$	17.50	Overpriced	Sell
D	$11\% + 1.28 (19\% - 11\%) = 21.24$	23.00	Under priced	Buy

Portfolio Risk and Evaluation

Illustration 33.

Share of Sharee Limited has a beta factor of 1.8. The NIFTY has yielded a return of 17.5%. 6.75% ₹100 Treasury Bills are traded at ₹108. Ascertain —

- Expected Return on Shares of Sharee Ltd under CAPM.
- Alpha Factor of Shares of Sharee Ltd if the past 5 Years actual returns on shares of Sharee Ltd are — 23.4%; 27.2%; 26.6%; 24.3% and 28.5%.

Solution:

1. Expected Return on Shares of Sharee Ltd $[E(R_v)]$ (Under CAPM)

(a) Computation of Risk Free Return (R_F)

Particulars	Value
Face Value of Treasury Bills	₹100
Return on Face Value (in %)	6.75%
Return on Treasury Bills (in Value) [₹100 x 6.75%]	₹6.75
Trading Price of Treasury Bills	₹108
Risk Free Return (R_F) as per Market Expectations [Actual Return ₹6.75/Market Price ₹108]	6.25%

(b) Expected Return $[E(R_s)]$

$E(R_s)$	$R_F + [\beta_v \times (R_M - R_F)]$
Risk Free Return	R_F 6.25% [As per Working Note 1 (a)]
Return on Market Portfolio	R_M 17.5% [Return on NIFTY]
Beta Factor	β_v 1.80 [Given]

$$\begin{aligned}
 E(R_s) &= R_F + [\beta_v \times (R_M - R_F)] \\
 &= 6.25\% + [1.80 \times (17.5\% - 6.25\%)] \\
 &= 6.25\% + [1.80 \times 11.25\%] = 6.25\% + 20.25 = 26.5\%
 \end{aligned}$$

2. Value of Alpha (α_v) for Return on Shares of Sharee Ltd [$E(R_s)$]

Year	Actual Return	Abnormal Return [AR_s]
(1)	(2)	(3) = (1) - $E(R_s)$
1	23.4	23.4% - 26.50 = (3.10%)
2	27.2	27.2% - 26.50 = 0.70%
3	26.6	26.6% - 26.50 = 0.10%
4	24.3	24.3% - 26.50 = (2.20%)
5	28.5	28.5% - 26.50 = 2.00%
Total		(2.50%)

$$\alpha V = \sum AR_s \div n = (2.50\%) \div 5 \text{ Years} = (0.50\%)$$

Inference: Alpha is negative. Therefore, expected return will be less than return under CAPM to the extent of 0.50%.

Illustration 34.

Returns on two portfolios, B and L, for the past 4 years are —

Year	1	2	3	4
Portfolio B	13.00%	13.50%	12.50%	14.00%
Portfolio L	14.35%	11.75%	13.60%	12.90%

Beta factor of the two portfolios are 1.3 and 1.2 respectively. If the market portfolio fetches 12% return and RBI Bonds, which are considered risk free, yield 5% return, which of the above two portfolios will an investor prefer?

Solution:**1. Computation of Expected Rate of Return under CAPM**

$$E(R_x) = R_F + [\beta_x \times (R_M - R_F)] \text{ [Expected Return on Portfolio X]}$$

$$\text{Risk Free Return } R_F = 5\% \text{ [Treasury Bills]}$$

$$\text{Return on Market Portfolio } R_M = 12\% \text{ [Given]}$$

Expected Return on	Portfolio B	Portfolio L
Beta Factor	1.30	1.20
Expected Return	$E(R_B) = R_F + [\beta_B \times (R_M - R_F)]$ $= 5\% + [1.30 \times 12\% - 5\%]$ $= 5\% + [1.30 \times 7\%]$ $= 5\% + 9.1\% = \mathbf{14.10\%}$	$E(R_L) = R_F + [\beta_L \times (R_M - R_F)]$ $= 5\% + [1.20 \times 12\% - 5\%]$ $= 5\% + [1.20 \times 7\%]$ $= 5\% + 8.4\% = \mathbf{13.40\%}$

2. Computation of Alpha Factors

Year	Portfolio B		Portfolio L	
	Actual Return	Abnormal Return [AR_B]	Actual Return	Abnormal Return [AR_L]
(1)	(2)	(3) = (1) - $E(R_B)$	(4)	(5) = (4) - $E(R_L)$
1	13.00%	13.00% - 14.10% = (1.10%)	14.35%	14.35% - 13.40% = 0.95%
2	13.50%	13.50% - 14.10% = (0.60%)	11.75%	11.75% - 13.40% = (1.65%)
3	12.50%	12.50% - 14.10% = (1.60%)	13.60%	13.60% - 13.40% = 0.20%
4	14.00%	14.00% - 14.10% = (0.10%)	12.90%	12.90% - 13.40% = (0.50%)
		(3.40%)		(1.00%)

Alpha Factor:

$$\text{Portfolio B } \alpha_B = \sum AR_B \div n = ((3.40\%) \div 4 \text{ Years}) = (0.85\%)$$

$$\text{Portfolio L } \alpha_L = \sum AR_L \div n = ((1.00\%) \div 4 \text{ Years}) = (0.25\%)$$

3. Expected Return adjusted for Alpha

Alpha Adjusted Return = Return under CAPM + α

$$\text{Portfolio B} = E(R_B) + \alpha_B = 14.10\% - 0.85\% = 13.25\%$$

$$\text{Portfolio L} = E(R_L) + \alpha_L = 13.40\% - 0.25\% = 13.15\%$$

Conclusion: The Alpha for Security B is higher than L, indicating its better performance relative to L. Hence, an investor should prefer Portfolio B.

Illustration 35.

Portfolio B, a fully diversified portfolio, has a standard deviation of 6%. The NIFTY has yields a return of 16.5%, with a standard deviation of 4%. Ascertain the expected return of Portfolio B under the following three cases —

- 5.80% ₹100 Central Government guaranteed RBI Bonds is traded at ₹116;
- Market's Attitude towards risk is 3.5;
- Risk Free Return is 8%.

Solution

$$\begin{aligned} \text{Expected Return on Portfolio } R_P &= R_F + \lambda \times \sigma_P \\ &= (R_M - R_F) \div \sigma_M \end{aligned}$$

Particulars	Case 1	Case 2	Case 3
Risk Free Return [R_F]	5% [Note 1]	2.5% [Note 2]	8% [Given]
Market's Attitude towards Risk (λ) = $(R_M - R_F) \div \sigma_M$	2.875 [16.50% - 5%]/4%	3.5 [Given]	2.125 [16.50% - 8%]/4%
Expected Return [R_P] = $R_F + \lambda \times \sigma_P$	22.25% [5% + (2.875 x 6%)]	23.50% [2.5% + (3.5 X 6%)]	20.75% [8% + (2.125 x 6%)]

Note:

1. Risk Free Return [Case 1]:

- Return on RBI Bonds = 5.80% on Face Value of ₹100 ₹5.80
- Ruling Market Price of the Bond ₹116
- Rate of Return on Market Price (₹5.80/ ₹116) 5%

2. Risk Free Return [Case 2]:

$$\text{Market's Attitude towards Risk } (\lambda) = (R_M - R_F) \div \sigma_M = 3.5$$

$$(R_M - R_F) = \lambda \times \sigma_M$$

$$R_F = R_M - \lambda \times \sigma_M$$

$$\text{Therefore, } R_F = 16.50\% - (3.5 \times 4\%) = 16.50\% - 14\% = 2.50\%$$

Illustration 36.

Stock P has a Beta of 1.50 and a market expectation of 15% return. For Stock Q, it is 0.80 and 12.5% respectively. If the risk free rate is 6% and the market risk premium is 7%, evaluate whether these two stocks are priced correctly? If these two stocks to be regarded as correctly priced, what should the risk free rate and market risk premium be?

Solution:

1. Expected Return [E(R)] under CAPM

$$\begin{aligned}
 \text{Expected Return of Stock X } [E(R_x)] &= R_F + \beta_x \times [E(R_M) - R_F] \\
 \text{Risk Free Return } [R_F] &= 6\% \\
 \text{Risk Premium } [E(R_M) - R_F] &= 7\% \\
 \text{Beta of Stock P } [\beta_P] &= 1.50 \\
 \text{Beta of Stock Q } [\beta_Q] &= 0.80 \\
 \text{Stock P } [E(R_P)] &= R_F + \beta_P \times [E(R_M) - R_F] \\
 &= 6\% + 1.50 \times 7\% = 6\% + 10.50\% = 16.50\% \\
 \text{Stock Q } [E(R_Q)] &= R_F + \beta_Q \times [E(R_M) - R_F] \\
 &= 6\% + 0.80 \times 7\% = 6\% + 5.60\% = 11.30\%
 \end{aligned}$$

2. Evaluation of Market Price

Particulars	Stock P	Stock Q
Expected Return (Market) [A]	15.00%	12.50%
Expected Return under CAPM [B]	16.50%	11.30%
Market Expectations [A] vs. CAPM Return [B]	[B] is Higher	[B] is Lower
Inference	Stock P gives lesser return than what it should give	Stock Q gives higher return than what it should give
Conclusion	Stock P is Overvalued	Stock P is Undervalued
Recommendation	SELL	BUY

3. Determination of Risk Free Return

Alternative 1

Let, Risk free return = R_F

Market Risk Premium = RP

For security P, under CAPM

$$15\% = R_F + 1.5 \times RP$$

$$R_F = 15 - 1.5 RP \quad (1)$$

For security Q, Under CAPM

$$12.5 = R_F + 0.80 RP$$

$$R_F = 12.5 - 0.80 RP \quad (2)$$

R_F determined under equation (1) and equation (2) should be equal. Therefore,

$$15 - 1.5 RP = 12.5 - 0.80 RP$$

$$15 - 12.5 = 1.5 R_P - 0.80 R_P$$

$$2.5 = 0.7 R_P$$

$$R_P = 2.5/0.7 = 3.57\%$$

Using $R_P = 3.57\%$, in equation (1)

$$R_F = 15 - 1.5 \times 3.57$$

$$= 9.64\%$$

Alternative 2:

Rule: If the stocks are correctly priced, then the Risk - Return Ratio should be the same i.e.,

$$(R_P - R_F) \div \beta_P = (R_Q - R_F) \div \beta_Q$$

$$\frac{15 - R_F}{1.5} = \frac{12.5 - R_F}{0.80}$$

$$1.5(12.5 - R_F) = 0.80(15 - R_F)$$

$$18.75 - 1.5 R_F = 12 - 0.80 R_F$$

$$18.75 - 12 = 1.5 R_F - 0.80 R_F$$

$$6.75 = 0.7 R_F$$

$$R_F = 9.64\%$$

$$\begin{aligned} \text{Market Risk Premium} &= (R_P - R_F) \div \beta_P \\ &= (15 - 9.64) \div 1.5 \\ &= 3.57\% \end{aligned}$$

Illustration 37.

Following are the information on two Portfolios, D and G —

Particulars	Portfolio D	Portfolio G
Elimination of Unsystematic Risk (Diversifiable Risk) Variance $[\sigma^2]$	Complete 6.66	Partial 14.96

The Sensex has returned an average of 16.25% on the investment in the past years. The expected appreciation in return is 3% on the previous year's return. The variance of the return on Sensex is measured at 2.96.

7% ₹1,000 Government Guaranteed Bonds are traded at ₹1,094. The covariance between Portfolio G and the Market is 4.96. Ascertain the expected return on Portfolio D and G.

Solution:

1. Evaluation of Portfolio and Determination of Return Measuring Model

Particulars	Portfolio D	Portfolio G
Elimination of Unsystematic Risk	Complete	Partial
Nature of Portfolio	Efficient	Inefficient
Expected Return can be based on Expected Return of the Portfolio $[E(R_P)]$	Capital Market Line $E(R_D) = R_F + \lambda \sigma_D$	Capital Asset Pricing Model $E(R_G) = R_F + \beta_G \times [E(R_M) - R_F]$

2. Expected Return of Portfolio D (Capital Market Line Model)

Expected Return $E(R_D)$ = Risk Free Return (R_F) + [Market Price of Risk(λ) X Risk of Portfolio D(σ_D)]

$$E(R_D) = 6.40\% + (6.01 \times 2.58\%) = 6.40\% + 15.51\% = \mathbf{21.91\%}$$

(a) Risk Free Return (R_F)

Particulars		Value
Actual Return on RBI Bonds	7% on Face Value of ₹1,000	₹70
Ruling Market Price of the Bond	Actual Return ₹70 ÷ Ruling Market Price ₹1,094	₹1,094
Market's Risk Free Return		6.40%

(b) Market Price of Risk (λ) = Expected Market Risk Premium ÷ Risk of Market Returns

$$= [E(R_M) - E(R_F)] \div \sigma_M$$

Particulars			Value
Add:	Past Average Market Return		16.25%
	Increase in Market Return	[3% of Past Average Return 16.25% = 3% X 16.25%]	.49%
Less:	Expected Market Return	$[E(R_M)]$	16.74%
	Risk Free Return	$[R_F]$	6.40%
Expected Market Risk Premium			[A] 10.34%
Variance on Market Return $[\sigma_M^2]$			2.96
Standard Deviation $[\sigma_M] = \sqrt{2.96}$			[B] 1.72%
Market Price of Risk $[\lambda]$			[A] ÷ [B] 6.01

(c) Risk of Portfolio D $[\sigma_D] = \sqrt{\text{Variance of Portfolio D}} = \sqrt{6.66} = \mathbf{2.58\%}$ **3. Expected Return of Portfolio G**

(Capital Asset Pricing Model)

Expected Return $E(R_G)$ = Risk Free Return (R_F) **Plus** Portfolio Beta β_G X [Expected Market Return $E(R_M)$

Less Risk Free Return (R_F)

$$\begin{aligned} E(R_D) &= 6.40\% + [1.68 \times (16.74\% - 6.40\%)] \\ &= 6.40\% + [1.68 \times 10.34\%] \\ &= 6.40\% + 17.37\% = \mathbf{23.77\%} \end{aligned}$$

(a) Risk Free Return (R_F) = 6.40% [From 1 Above]

(b) Expected Market Return $[E(R_M)]$ = 16.74% [From 1 Above]

(c) Beta of Portfolio G (β_G):

$$\begin{aligned} &= \text{Covariance of Portfolio G and Market } [Cov_{BM}] \div \text{Variance of Market Return } [\sigma_M^2] \\ &= 4.96 \div 2.96 = 1.68 \end{aligned}$$

Illustration 38.

A Company has a choice of investments between several different Equity Oriented Funds. The Company has an amount of ₹1 Crore to invest. The details of the mutual funds are as follows -

Mutual Funds	M	N	O	P	Q
Beta	1.7	1.0	0.9	2.1	0.7

**Required:**

- (a) If the Company invests 20% of its investments in the first two mutual funds, and an equal amount in the mutual funds O, P and Q what is beta of the portfolio?
- (b) If the company invests 15% of its investments in O, 15% in M, 10% in Q and the balance in equal amount in the other two mutual funds, what is the beta of the portfolio?
- (c) If the expected return of the market portfolio is 14% at a beta factor of 1.0, what will be the portfolios' expected return in both the situations given above?

Solution: 1. Situation A: Investment in M and N at 20% each, equal proportion in O, P and Q

Mutual fond	Proportion of Investment	Beta of the Fund	Proportion X Fund Beta
(1)	(3)	(4)	(5) = (3)x(4)
M	0.2	1.7	$0.2 \times 1.7 = 0.34$
N	0.2	1.0	$0.2 \times 1.0 = 0.20$
O	0.2	0.9	$0.2 \times 0.9 = 0.18$
P	0.2	2.1	$0.2 \times 2.1 = 0.42$
Q	0.2	0.7	$0.2 \times 0.7 = 0.14$
Portfolio Beta			1.28

Investment in O, P & Q = $(1 - \text{Investment in M and N}) \div 3 = (1 - 0.2 - 0.2) \div 3 = 0.6 \div 3 = 0.2$ or 20%

2. Situation B: Investment in M at 15%, O at 15% and P at 10%, equal proportion in N and P

Mutual fund	Proportion of Investment	Beta of the Fund	Proportion X Fund Beta
(1)	(3)	(4)	(5) = (3)x(4)
M	0.15	1.7	$0.15 \times 1.7 = 0.255$
N	0.30	1.0	$0.30 \times 1.0 = 0.300$
O	0.15	0.9	$0.15 \times 0.9 = 0.135$
P	0.30	2.1	$0.30 \times 2.1 = 0.630$
Q	0.10	0.7	$0.10 \times 0.7 = 0.070$
Portfolio Beta			1.390

Investment in N and P = $(1 - \text{Investment in M, O and Q}) \div 2$

= $(1 - 0.15 - 0.15 - 0.1) \div 3 = 0.6 \div 2 = 0.3$ or 30%

3. Expected Return from Portfolio

Note/Assumption: In the absence of Risk Free Rate of Return (RF), it is assumed that expected return from portfolio is to be computed using Market Model i.e., there is no risk free return, and the entire fund return moves in line with the market return. CAPM is not applicable.

Expected Return = Market Return X Portfolio Beta.

Situation	Return in %	Return in ₹
A	$14\% \times 1.28 = 17.92\%$	$14 \times 17.92\% = 17.92$ lakhs
B	$14\% \times 1.39 = 19.46\%$	$14 \times 19.46\% = 19.46$ lakhs

Illustration 39.

Mr. Q owns a portfolio with the following characteristics —

	Security A	Security B	Risk Free Security
Factor 1 Sensitivity	0.80	1.50	0
Factor 2 Sensitivity	0.60	1.20	0
Expected Return	20%	25%	15%

It is assumed that security returns are generated by a two-factor model —

- If Mr. Q has ₹1,00,000 to invest and sells short ₹50,000 of Security B and purchases ₹1,50,000 of Security A what is the sensitivity of Mr. Q portfolio to the two factors?
- If Mr. Q borrows ₹1,00,000 at the risk free rate and invests the amount he borrows along with the original amount of ₹1,00,000 in Security A and B in the same proportion as described in Part (a), what is the sensitivity of the portfolio to the two factors?
- What is the expected return premium of Factor 2?

Solution:**1. Sale of Security B and Investment in Security A**

Security	Portfolio Value (Weights)	Sensitivity (Factor 1)	Product (Factor 1)	Sensitivity (Factor 2)	Product (Fac- tor 2)
A (Invested)	1,50,000	0.80	1,20,000	0.60	90,000
B (Sold)	(50,000)	1.50	(75,000)	1.20	(60,000)
	1,00,000		45,000		30,000

Portfolio Sensitivity (Product ÷ Weights) for -

- Factor 1 = $45,000 \div 1,00,000 = 0.45$
- Factor 2 = $30,000 \div 1,00,000 = 0.30$

2. Borrowing at Risk Free Return, Investment in Security A and Security B

Security	Portfolio Value (Weights)	Sensitivity (Factor 1)	Product (Factor 1)	Sensitivity (Factor 2)	Product (Factor 2)
A (Invested)	3,00,000	0.80	2,40,000	0.60	1,80,000
B (Invested)	(1,00,000)	1.50	(1,50,000)	1.20	(1,20,000)
Risk Free (Sold)	(1,00,000)	0.00	NIL	0.00	—
	1,00,000		90,000		60,000

Portfolio Sensitivity (Product ÷ Weights) for —

- Factor 1 = $90,000 \div 1,00,000 = 0.90$
- Factor 2 = $60,000 \div 1,00,000 = 0.60$

(It is assumed that Portfolio Sensitivity = Weighted Average Sensitivity of Individual Securities comprising the portfolio)

3. Return Premium of Factor 2

Since security returns are generated by a two factor model, it assumed that the model is linear equation in two variables —

Where,

$$R_s = R_f + \beta_{F1} X + \beta_{F2} Y,$$

Where,

R_s = Return of the Security S

R_f = Risk Free Return

β_{F1} = Factor 1 Sensitivity

β_{F2} = Factor 2 Sensitivity

X = Return Premium for Factor 1

Y = Return Premium for Factor 2

Therefore,

$$R_A = 20\% = 15\% + 0.8x + 0.6y \Rightarrow 0.8x + 0.6y = 5$$

$$R_B = 25\% = 15\% = 1.5x + 1.2y \Rightarrow 1.5x + 1.2y = 10$$

$$\text{From First Equation } x = \frac{5 - 0.6y}{0.8} = 6.25 - 0.75y$$

Substituting for X in second equation

$$1.5 X (6.25 - 0.75y) + 1.2y = 10$$

$$\Rightarrow 9.375 - 1.125y + 1.2y = 10$$

$$\Rightarrow 0.625 = 0.075y \Rightarrow y = 0.625 \div 0.075 = \mathbf{8.33\%}.$$

Therefore, Expected Return Premium for Factor 2 is **8.33%**.

Illustration 40.

The total market value of the equity share of Dharam Company is ₹60,00,000 and the total value of the debt is ₹40,00,000. The treasurer estimate that the beta of the stocks is currently 1.5 and that the expected risk premium on the market is 12 per cent. The Treasury bill rate is 10 per cent.

Required—

- What is the beta of the Company's existing Portfolio of assets?
- Estimate the Company's Cost of Capital and the discount rate for an expansion of the company's present business.

Solution:

(1) Beta of Company's existing Portfolio of assets

Notation	Particulars	Value
β_E	Beta of Equity	1.5
β_D	Beta of Debt (since company's debt capital is risk less, its Beta is Zero)	0
E	Value of Equity	60,00,000
D	Value of Debt	40,00,000
β_A	Beta of company assets	To be ascertained
$R_M - R_F$	Risk Premium	12%
R_F	Risk Free Rate of Return	10%

D+E = Total value of the Company

= Value of Debt + Value of Equity

= 40,00,000 + 60,00,000 = ₹1,00,00,000

$$\begin{aligned}\Rightarrow B_A &= \{\beta_E \times \text{Equity} \div [\text{Equity} + \text{Debt} \times (1 - \text{Tax})]\} + \{\beta_D \times \text{Debt} (1 - \text{Tax}) \div [\text{Equity} + \text{Debt} \times (1 - \text{Tax})]\} \\ &= [1.5 \times ₹60 \text{ lakhs} / ₹100 \text{ lakhs}] + [0 \times ₹40 \text{ lakhs} / ₹100 \text{ lakhs}] \\ &= 0.9 + 0 = \mathbf{0.9}\end{aligned}$$

(2) Estimation of Company's Cost of Capital

Cost of Capital = K_e

= $R_f + [\beta_p \times \text{Risk Premium}]$

= $10 + (0.9 \times 12) = 10 + 10.8 = 20.8\%$

(3) Discount Rate for an expansion of the company's present business

- In case of expansion plan, 20.8% can be used as discount factor.
- In case of diversification plan, a different discount factor would be used depending on its risk profile.

Illustration 41.

The Capital of J Ltd, an exclusive software support service provider to B Ltd, is made up of 40% Equity Share Capital, 60% Accumulated Profits and Reserves. J does not have any other clients. The sensex yields a return of 15%. The risk-less return is measured at 6.75%.

- If the shares of J Ltd carry a Beta (β_J) of 1.6, compute cost of capital, and also the beta of activity support service to B Ltd.
- If there is another client, K Ltd, accounting for 35% of Assets of J Ltd, with a Beta of 1.40, what should be the Beta of B Ltd, so that the equity beta of 1.60 is not affected? In such a case, what should be expected return from B Ltd and K Ltd?

Solution:

1. Beta of Project (Software Services to B Ltd)

Description of Factor	Measure
(a) Capital Structure of J Ltd	All Equity
(b) Nature of Capital Structure of J	Unlevered
(c) Beta of Equity of J Ltd [β_U]	1.60
(d) Project Status (Multiple or Single)	Single
(e) Project Beta (Beta of service to B = β_B)	To be ascertained
(f) Rule for Unlevered Firm with Single Project	$\beta_U = \beta_J$
(g) Therefore, Beta of Software Services to B Ltd	1.60

2. Cost of Capital

Cost of Equity (K_E) = Return expected on Shares of J Ltd (i.e. $E(R_J)$)

$\Rightarrow K_E$ = Expected Return on J under CAPM

= $R_f + \beta_J \times (R_M - R_f)$

$$= 6.75\% + [1.60 \times (15\% - 6.75\%)]$$

$$= 6.75\% + [1.60 \times 8.25\%] = 6.75\% + 13.20\% = 19.95\%$$

3. Beta of Services to B Ltd (Multiple Project Model)

Beta of J Shares Ltd (β_J) under Multiple Project scenario = Weighted Average of Betas of Projects

$$\Rightarrow \beta_J = W_B \times \beta_B + W_K \times \beta_K$$

$$\Rightarrow 1.60 = [(1 - 35\%) \times \beta_B] + [35\% \times 1.40]$$

$$\Rightarrow 1.60 = 0.65 \times \beta_B + 0.49$$

$$\Rightarrow 0.65 \beta_B = 1.60 - 0.49$$

$$\Rightarrow \beta_B = 1.11 \div 0.65 = 1.708$$

Beta of B Ltd (β_B) should be 1.708

4. Expected Return on Project B and Project K (Under CAPM Method)

(a) Expected Return on Project B [$E(R_B)$]

$$= R_F + [\beta_B \times (R_M - R_F)]$$

$$= 6.75\% + [1.708 \times (15\% - 6.75\%)] = 6.75\% + [1.708 \times 8.25\%]$$

$$= 6.75\% + 14.091\% = \mathbf{20.841\%}$$

(b) Expected Return on Project K [$E(R_K)$]

$$= R_F + [\beta_K \times (R_M - R_F)]$$

$$= 6.75\% + [1.40 \times (15\% - 6.75\%)] = 6.75\% + [1.40 \times 8.25\%]$$

$$= 6.75\% + 11.55\% = 18.30\%$$

Illustration 42.

A project had an equity beta of 1.2 and was going to be financed by a combination of 40% debt and 60% equity.

Assuming debt - beta to be zero, calculate the project beta and Return from the Project taking risk free rate of return to be 10% and return on market portfolio at 18%.

Solution:

Basic Data

Particulars	Notation	Value
Equity Beta of the Project	β_{equity}	1.2
Risk free rate of Return	R_f	10%
Return on Market Portfolio	R_m	18%
Debt-Equity Mix		40:60
Beta of the Project	β_p	To be ascertained

1. Computation of Project Beta

$$\beta_p = \left[\beta_{\text{equity}} \times \frac{E}{D+E} \right] + \left[\beta_{\text{DEBT}} \times \frac{E}{D+E} \right] = (1.2 \times 0.6) + (0 \times 0.4) = 0.72$$

2. Computation of Return from the Project

$$\begin{aligned}\text{Return from the Project} &= R_f + \beta_p (R_m - R_f) \\ &= 0.10 + 0.72 \times (0.18 - 0.10) = 0.1576 = 15.76\%\end{aligned}$$

Illustration 43.

- X Ltd., has an expected return of 20% and Standard Deviation of 40%.
- Y Ltd., has an expected return of 22% and Standard Deviation of 38%.
- X Ltd., has a beta of 0.86 and Y Ltd., a beta of 1.24.
- The correlation coefficient between the return of X Ltd., and Y Ltd., is 0.72. The Standard deviation of the market return is 20%.

Suggest.

- Is investing in Y Ltd., better than investing in X Ltd.?
- If you invest 30% in Y Ltd., and 70% in X Ltd., what is your expected rate of return and Portfolio Standard Deviation?
- What is the market Portfolio's expected rate of return and how much is the risk free rate?
- What is the beta of portfolio if X Ltd.'s weight is 60% and Y Ltd.'s weight is 40%

Solution:

(1) Better Investment

- X Ltd., has lower return and higher risk than Y Ltd.,
- Investing in Y Ltd., is better than in X Ltd., because the Returns are higher and the Risk lower.
- However, investing in both will yield diversification advantage.

(2) Expected Return and Standard Deviation of the Portfolio

- **Return on the Portfolio of X and Y:** 70% of Return on Security X + 30% of Return on Security Y i.e.
 $70\% \times 20\% + 30\% \times 22\% = 15.4\% + 7.2\% = \mathbf{20.6\%}$
- **Risk on the Portfolio of X and Y:**

$$\begin{aligned}\sigma_{XY} &= \sqrt{(\sigma_X^2 \times W_X^2) + (\sigma_Y^2 \times W_Y^2) + 2(\sigma_X \times W_X \times \sigma_Y \times W_Y \times \rho_{XY})} \\ &= \sqrt{(0.40^2 \times 0.70^2) + (0.38^2 \times 0.30^2) + (2 \times 0.40 \times 0.70 \times 0.38 \times 0.30 \times 0.72)} \\ &= \sqrt{[(0.0784) + (0.012996) + (0.04596)]} \\ \text{Risk} &= \sqrt{0.137356} = \mathbf{37.06\%}\end{aligned}$$

(3) Market Portfolio's Expected Rate of Return

The Risk free rate and Market Rate will be the same for X and Y Ltd.

$$\text{Expected Return on Security} = R_f + \beta (R_m - R_f)$$

$$E(R_X) = 20 = R_f + 0.86 \times (R_m - R_f) \Rightarrow (1)$$

$$E(R_Y) = 22 = R_f + 1.24 \times (R_m - R_f) \Rightarrow (2)$$

$$(1) - (2)$$

$$E(R_X) - E(R_Y) = -2$$

$$\begin{aligned}
 (R_m - R_f) \times (0.86 - 1.24) &= -2 \\
 (R_m - R_f) &= (-2) \div (-0.38) \\
 (R_m - R_f) &= 5.26\% \\
 \text{Substituting } (R_m - R_f) &= 5.26\% \text{ in (1)} \\
 E(R_X) &= R_f + 0.86 \times (R_m - R_f) \\
 20 &= R_f + 0.86 \times 5.26 \\
 20 &= R_f + 4.52 \\
 R_f &= 20 - 4.52 = 15.48\% \\
 R_m - R_f &= 5.26\% \\
 R_m &= 5.26 + R_f = 5.26 + 15.48 = \mathbf{20.74\%}
 \end{aligned}$$

(4) Beta of the Portfolio if X Ltd.'s weight is 60% and Y Ltd., 's weight is 40%

$$\begin{aligned}
 \beta_{XY} &= \beta_X \times W_X + \beta_Y \times W_Y \\
 &= 0.86 \times 0.6 + 1.24 \times 0.4 = \mathbf{1.012}
 \end{aligned}$$

Illustration 44.

Zabong, a debt-free Limited Company, caters to the life style product needs of men. It has four divisions Apparels, Body Care, Gizmos and Sport.

The following particulars are available on each of the four lines of activity from such industry —

Line	Industry Norms for Risk on Returns	Correlation with Market
Apparels	4.50%	0.80
Body Care	3.50%	0.95
Gizmos	8.00%	0.75
Sport	6.75%	0.25

The BSE 500 returns 13% on investment with a risk measure of 2.25%. If the risk free return is measured at 5.24% and assets blocked for each of those division is ₹7.40 Crores, ₹5.80 Crores, ₹4.60 Crores and ₹2.20 Crores, ascertain the Expected Return on Equity of “Zabong”?

Solution:

1. Determination of Betas of the Divisions

$$\begin{aligned}
 \text{Beta of Project X } (\beta_x) &= [\text{Cov}_{xM}] \div \sigma_M^2 \\
 &= \rho_{xM} \times \sigma_x \times \sigma_M \div \sigma_M^2 \\
 (\beta_x) &= [\sigma_x \times \sigma_M] \sigma_M
 \end{aligned}$$

Where, σ_x = Standard Deviation of Project X i.e. Risk on Returns from Project X

σ_M = Standard Deviation of market i.e. Risk on Returns from Market

ρ_{xM} = Correlation of the Project/ Industry with the Market

Line	Risk on Returns (o)	Correlation with Market (p)	Beta of the Division	Notation
(1)	(2)	(3)	(4) = (2) x (3) ÷ σ_M i.e. 2.25%	(5)
Apparels	4.50%	0.80	$4.50\% \times 0.80 \div 2.25\% = 1.60$	β_A
Body Care	3.50%	0.95	$3.50\% \times 0.95 \div 2.25\% = 1.47$	β_B

Gizmos	7.50%	0.75	$7.50\% \times 0.75 + 2.25\% = 2.50$	β_G
Sport	6.75%	0.25	$6.75\% \times 0.25 \div 2.25\% = 0.75$	β_s

2. Determination of Equity Beta of Bounce!

Equity Beta of Janong (Unlevered Firm) β_U = Weighted Average Beta of the Projects of the company
 $= \sum (W_x \times \beta_x)$,

Where X = Project

W_x = Weight of investment in project to the total investment

β_x = Beta of Project X

Line	Investment (₹Cr.)	Weight	Beta of the Division	Weighted Beta
(1)	(2)	(3) = (2) ÷ $\sum(2)$	(4)	(5) = (3)x(4)
Apparels	7.40	$7.40 \div 20.00 = 0.37$	$\beta_A = 1.60$	0.5920
Body Care	5.80	$5.80 \div 20.00 = 0.29$	$\beta_B = 1.47$	0.4263
Gizmos	4.60	$4.60 \div 20.00 = 0.23$	$\beta_G = 2.50$	0.5750
Sport	2.20	$2.20 \div 20.00 = 0.11$	$\beta_s = 0.75$	0.0825
	20.00	Weighted Average Beta		1.6758

Therefore, Beta of Equity of Zabong! (β_{Zabong}) is **1.6758**

3. Expected Return on Equity of Bounce!

(Under CAPM)

$$\begin{aligned}
 E(R_{Zabong}) &= R_F + [\beta_{Zabong} \times (R_M - R_F)] \\
 &= 5.24\% + [1.6758 \times (13\% - 5.24\%)] \\
 &= 5.24\% + [1.6758 \times 7.76\%] \\
 &= 5.24\% + 13.00\% = 18.24\%
 \end{aligned}$$

Illustration 45.

The equity of Reebon Automobile Ltd (RAL) is ₹ 750 Crores. Its debt is worth ₹ 330 Crores. 84% of the value is attributable to Car & Auto segment, which has an Asset Beta (β_{CA}) of 1.25. The balance value is applied on Miscellaneous Accessories Division, which has an Asset Beta of (β_{MA}) of 1.10.

Required —

- Equity Beta if, the Debt Beta is - (i) 0.15; (ii) 0.20 and (iii) 0.25;
- If RAL decides to alter its Debt Equity Position by raising further Debt and buying back equity to have its Debt Equity Ratio at 1.50. Ascertain Equity Beta [β_E].

[You may assume that the present Debt Beta (β_{D1}) is 0.20, and any further funds raised by way of Debt will have a Beta (β_{D2}) of 0.30.]

Solution:

1. Determination of Asset Beta [β_A]

(Multiple Project Scenario)

Asset Beta β_A = Weighted Average of Betas of the Projects

$$\Rightarrow \beta_A = W_{CA} \times \beta_{CA} + W_{MA} \times \beta_{MA}$$

Since, Beta of Levered Firm = Beta of its Asset;

$$\Rightarrow \beta_{RAL} = W_{CA} \times \beta_{CA} + W_{MA} \times \beta_{MA}$$

Where,

β_{RAL} = Beta of the Firm i.e. Reebon Automobile Ltd (RAL)

W_{CA} = Proportion of Value attributable to Car & Auto Segment to the Total Value

β_{CA} = Beta of Car & Auto Segment

W_{MA} = Proportion of Value attributable to MA Segment to the Total Value

β_{MA} = Beta of Miscellaneous Accessories Division

$$\beta_{RAL} = 84\% \times 1.25 + (1 - 84\%) \times 1.10$$

$$= 0.84 \times 1.25 + (1 - 0.84) \times 1.10$$

$$= 1.05 + (0.16 \times 1.10) = 1.05 + 0.176 = 1.226$$

2. Determination of Equity Beta [β_E]

Firm Beta β_L = Weighted Average of Betas of Debt and Equity

Since Firm Beta = Asset Beta; $\beta_L = \beta_{RAL}$ determined in 1 above.

$$\Rightarrow \beta_{RAL} = [(Debt/Value) \times \beta_D] + [(Equity/Value) \times \beta_E] \text{ or } [(D/V) \times \beta_D] + [(E/V) \times \beta_E]$$

Multiplying Both Sides by "V"

$$\Rightarrow V \times \beta_{RAL} = (D \times \beta_D) + (E \times \beta_E)$$

$$\Rightarrow E \times \beta_E = (V \times \beta_{RAL}) - (D \times \beta_D)$$

$$\Rightarrow \beta_E = [(V \times \beta_{RAL}) - (D \times \beta_D)] \div E$$

If Debt Beta (β_D) is	0.15	0.20	0.25
Equity Beta (β_E) is	$= (1080 \times 1.226) - (330 \times 0.15)$ 750	$= (1080 \times 1.226) - (330 \times 0.20)$ 750	$= (1080 \times 1.226) - (330 \times 0.25)$ 750
$\left(\frac{(V \times \beta_{RAL}) - (D \times \beta_D)}{E} \right)$	$= [1324.08 - 49.5] \div 750$ $= 1274.58 \div 750$ $= 1.699$	$= [1324.08 - 66] \div 750$ $= 1258.08 \div 750$ $= 1.677$	$= [1324.08 - 82.50] \div 750$ $= 1241.58 \div 750$ $= 1.655$

3. Determination of Asset Beta after Debt Equity Change [β_A]

(Multiple Project Scenario)

(a) Amount of Debt to be raised:

Particulars	Value
Total Value of the Firm [Equity ₹750 Cr. + Debt ₹330 Cr.]	₹1,080 Cr.
Desired Debt Equity Ratio	1.50: 1.00
Desired Debt Level [Total Value x Debt Ratio / (Debt Ratio + Equity Ratio)] [₹1,080 Cr. x 1.5/(1.50 + 1.00) = 1,080 x 1.50 ÷ 2.50]	₹648 Cr.
Less: Value of Debt (Existing)	(₹330 Cr.)
Value of Debt to be raised	₹318 Cr.

(b) Equity after Repurchase: Total Value ₹1,080 Cr. Less Desired Debt Level ₹648 Cr. = ₹432 Cr.

(C) Weighted Average Beta of RAL:

Source of Finance	Investment (₹ Cr.)	Weight	Beta of the Division	Weighted Beta
(1)	(2)	(3) = (2) ÷ Σ(2)	(4)	(5) = (3)X(4)
Equity	432	$432 \div 1,080 = \mathbf{0.40000}$	$\beta_E = ?$	$0.40 \times \beta_E$
Debt - 1	330	$330 \div 1,080 = \mathbf{0.30556}$	$B_{D1} = \mathbf{0.20}$	0.0611
Debt - 2	318	$318 \div 1,080 = \mathbf{0.29444}$	$B_{D2} = \mathbf{0.30}$	0.0883
	1,080	Weighted Average Beta		$0.1494 + (0.40 \times \beta_E)$

$$B_{RAL} = 0.1494 + (0.40 \times \beta_E)$$

$$\Rightarrow 1.226 = 0.1494 + (0.40 \times \beta_E)$$

$$\Rightarrow 0.40 \times \beta_E = 1.226 - 0.1494$$

$$\Rightarrow = 1.0766 \div 0.40 = 2.6915$$

Illustration 46.

A firm has an equity beta of 1.40 and is currently financed by 25% debt and 75% equity. What will be the company's equity beta if the company changes its financing policy to 33% and 67% equity? Assume corporation tax to stand at 35%.

Solution:

Asset Beta = Weighted Average Beta of Equity + Weighted Average Beta of Debt

$$\begin{aligned} \Rightarrow B_A &= \{\beta_E \times \text{Equity} \div [\text{Equity} + \text{Debt} \times (1 - \text{Tax})]\} + \{\beta_d \times \text{Debt} (1 - \text{Tax}) \div [\text{Equity} + \text{Debt} \times (1 - \text{Tax})]\} \\ &= \{(1.40 \times 0.75) \div [0.75 + 0.25 \times (1 - 0.35)]\} + \{(0 \times 0.25) \div [0.75 + 0.25 \times (1 - 0.35)]\} \\ &= (1.05 \div 0.9125) + 0 = 1.1506 \end{aligned}$$

$$\text{Firm's Beta} = \{\beta_E \times \text{Equity} \div [\text{Equity} + \text{Debt} \times (1 - \text{Tax})]\} + \{\beta_d \times \text{Debt} (1 - \text{Tax}) \div [\text{Equity} + \text{Debt} \times (1 - \text{Tax})]\}$$

$$1.1506 = \beta_E \times 0.67 \div [0.67 + 0.33 \times (1 - 0.35)] + 0$$

$$\beta_E = 0.8845 \times 1.1506 \div 0.67 = 1.52$$

Illustration 47.

ABC Ltd., is a consumer goods company which earns expected return of 14% on its existing operations subject to standard deviation of 20%. The company is owned by a family and the family has no other investment. New project is under consideration and the new project is expected to give a return of 18% subject to standard deviation of 32%. The new project has a correlation of 0.25 with ABC's existing operations.

The new project is likely to account for 25% of ABC's operations.

ABC is identified a utility function to apprise risky project.

The function is as under:-

Shareholder's utility = $100R - \sigma^2$; Where, R = Expected return (in %); σ^2 = Standard deviation of return (in %)

The project can be accepted only if total utility goes up. Evaluate the project.

Solution:

We may treat the existing Co and new project as to two securities Portfolio since we are aware that original company has 0.75 share and new project 0.25 finally in overall operation.

1. Expected return = Proportion of Investment x Return

$$= (0.75 \times 14\%) + (0.25 \times 18\%) = 15\%$$
2. Covariance = ρ_{AB} (Correlation between old and new operations) $\times \sigma_{\text{old project}} \times \sigma_{\text{new project}}$

$$= 0.25 \times 20 \times 32 = 160$$

$$\sigma_p = \sqrt{(\sigma_A^2 \times W_A^2) + (\sigma_B^2 \times W_B^2) + 2(\sigma_A \times W_A \times \sigma_B \times W_B \times \rho_{AB})}$$

$$\therefore \text{Variance of the company with new project} = (0.75^2 \times 20^2) + (0.25^2 \times 32^2) + (2 \times 0.75 \times 0.25 \times 160) = 349$$

$$\text{S.D.} = \sigma = \sqrt{349} = 18.68\%$$
3. Share holders utility without the project = $100 \times 12 - 20^2 = 800$ units
4. Shareholders utility with the project = $100 \times 13 - (18.68)^2 = 951$ units

Hence, project will increase the utility.

Illustration 48.

M/s. Z Steels Ltd., is planning for a diversification project in Telecom Sector. Its current equity beta is 1.25, whereas the automobile sector has 1.6.

If expected market return is 24%, risk free debt is 10% and taxation rate is taken as 25% and also that corporate debt is assumed to be risk free.

Compute suitable discount rate under the following situations.

- (a) Project financed by equity only.
- (b) By 30% debt and 70 % equity.
- (c) By 40% debt and 60% equity.

Solution:

Basic Data for Computation

Notation	Value
R_M	24%
R_F	10%
Tax Rate	25%
Beta of telecom sector	1.6
Equity Beta β_E	1.25

1. Project financed by Equity only

Particulars	Computation
Project Beta	$\beta_p = \beta_{\text{equity}}$ [Because Project is financed by Equity only] $= 1.6$
Return from the Project	$K_e = R_f + \beta (R_m - R_f)$ $= 10\% + 1.6 \times (24\% - 10\%)$ $= 32.4\%$

The rate of discount to be adopted for discounting the cash flows Project remains unaffected irrespective of the mode of financing. Hence, the discount rate is the same as 32.4% irrespective of the Sources of finance.

Illustration 49.

MTM Ltd., is a readymade garments company and is looking to diversity its activities into the electronics business.

The project it is considering has a return of 18% and MTM Ltd., is trying to decide whether the project should be accepted or not.

The applicable tax rate is 35%.

To help it decide it is going to use the CAPM, the company has to find a proxy beta for the project and has the following information on three companies in the electronics business:

- (a) S Ltd., equity beta of 1.5. Financed by 50% debt and 50% equity.
- (b) A Ltd., has an equity beta of 1.4, but it has just taken on a totally unrelated project, accounting for 20% of the company's value, that has an asset beta of 1.4. The company is financed by 40% and 60% equity.
- (c) M Ltd., Equity beta of 1.05. Financed by 35% debt and 65% equity.

Compute the Rate of Return to Excellent Ltd., if the debt equity ratio is 0.70:0.30 and the return on market is 14%.

Solution:

Computation of Project Beta (based on other Companies in the Industry)

1. S. Ltd.,

$$\begin{aligned}\text{Firm's Beta} &= \{\beta_E \times \text{Equity} \div [\text{Equity} + \text{Debt} \times (1 - \text{Tax})]\} + \{\beta_D \times \text{Debt} (1 - \text{Tax}) \div [\text{Equity} + \text{Debt} \times (1 - \text{Tax})]\} \\ \beta_A &= 1.5 \times (0.50) \div [0.50 + 0.50 \times (1 - 0.35)] + 0 \\ &= 1.5 \times 0.50 \div 0.825 = 0.9091\end{aligned}$$

2. A Ltd.,

$$\begin{aligned}\text{Firm's Beta} &= \{\{\beta_E \times \text{Equity} \div [\text{Equity} + \text{Debt} \times (1 - \text{Tax})]\} + \{\beta_D \times \text{Debt} (1 - \text{Tax}) \div [\text{Equity} + \text{Debt} \times (1 - \text{Tax})]\}\} \\ \beta_A &= 1.40 \times (0.60) \div [0.60 + 0.40 \times (1 - 0.35)] + 0 \\ &= 1.40 \times 0.60 \div 0.86 = 0.9767 \\ 0.9767 &= \text{Weighted Average Beta of individual projects} \\ &= 0.20 \times 1.40 (\text{Unrelated Project}) + 0.80 \times x (\text{Comparable Project}) \\ 0.9767 &= 0.28 + 0.8x \\ \Rightarrow x &= (0.9767 - 0.28) \div 0.80 = 0.8708\end{aligned}$$

3. M Ltd.,

$$\begin{aligned}\text{Firm's Beta} &= \{\beta_E \times \text{Equity} \div [\text{Equity} + \text{Debt} \times (1 - \text{Tax})]\} + \{\beta_D \times \text{Debt} (1 - \text{Tax}) \div [\text{Equity} + \text{Debt} \times (1 - \text{Tax})]\} \\ &= 1.05 \times 0.65 \div [0.65 + 0.35 \times (1 - 0.35)] + 0 \\ &= 0.6825 \div 0.8775 = 0.7778\end{aligned}$$

$$\begin{aligned}\text{Average Proxy Beta} &= \text{Simple Average of Beta of Comparable Projects of 3 firms} \\ &= (0.9091 + 0.8708 + 0.7778) \div 3 = 0.8526\end{aligned}$$

Therefore, Project Beta for Excellent Ltd for the new project (Electronics Business) is 0.8526

4. Computation of Expected Return of MTM Ltd. (Equity Beta)

$$\text{Expected Return from the Project (Under CAPM)} = R_F + \beta \times (R_M - R_F)$$

$$= 10\% + 0.8526 \times (14\% - 10\%) = 13.41\%$$

Expected Return under CAPM is 13.41%, which is lower than the expected return of 18% from the project. Therefore, the project can be taken up by the Company.

Illustration 50.

R Ltd and S Ltd are in the same risk class, paying taxes at 33%. They are registering steady earnings. A study of their financial statements and the market information highlights the following-

Particulars	A Ltd	BLtd
Capital Employed	₹1,500 Crores	₹1,000 Crores
Share Capital	₹850 Crores	₹600 Crores
Reserves	₹650 Crores	₹300 Crores
9% Debt	-	₹500 Crores
Market Value of Shares	₹3,500 Crores	₹1,850 Crores
Market Value of Debt	-	₹250 Crores
Profit After Tax	₹472.50 Crores	₹396 Crores

If Equity Beta of R Ltd is 1.20, ascertain —

(a) Cost of Equity of S Ltd

(b) Beta of Equity of S Ltd

(Assume that Debt has no Beta)

Solution:

1. Cost of Equity of S Ltd

$$\begin{aligned} \text{Cost of Equity } (K_E) &= \text{Equity Earnings} \div \text{Market Value of Equity} \\ &= ₹ 396 \text{ Crores} \div ₹ 1,850 \text{ Crores} = 21.40\% \end{aligned}$$

2. Beta Value of Equity of S Ltd

- Beta of S Ltd = Beta of its Assets
- Since, R Ltd and S Ltd are in the same industry and in the same risk class, Beta of S Ltd = Beta of R Ltd
- Since R Ltd is an all equity Company, Beta of R Ltd = Beta of Equity Shares of R Ltd = 1.20
- Therefore, Beta of Assets of S Ltd = 1.20; Beta of Debt = 0

$$\Rightarrow \beta_R = \frac{\beta_{\text{Equity}} \times \text{Equity}}{\text{Equity} + \text{Debt}(1 - \text{Tax})} + \frac{\beta_{\text{Debt}} \times \text{Debt} \times (1 - \text{Tax})}{\text{Equity} + \text{Debt}(1 - \text{Tax})}$$

$$\Rightarrow 1.20 = \beta_E \times 1,850 \div [1,850 + 250 \times (1 - 33\%)] + 0$$

$$\Rightarrow 1.20 = \beta_E \times 1,850 \div [1,850 + 250 \times (1 - 0.33\%)]$$

$$\Rightarrow 1.20 = \beta_E \times 1,850 \div [1,850 + 250 \times 0.67]$$

$$\Rightarrow 1.20 = \beta_E \times 1,850 \div [1,850 + 167.50]$$

$$\Rightarrow 1.20 = \beta_E \times 1,850 \div 2,017.50$$

$$\Rightarrow 1.20 = \beta_E \times 0.917$$

$$\Rightarrow \beta_E \times = 1.20 \div 0.917 = 1.309$$

Illustration 51.

SKY Info Space Ltd, is engaged in selling Softwares and Web Site Designing. They have 1,00,000 15% Debentures of ₹100 each outstanding. Market expectation on such debentures is 12%, and the market value reflects this expectation.

Their share capital consists of 5 Lakh Equity Shares of ₹100 each, traded at ₹450 each. Its equity beta is 1.50. The market risk premium is 7.5%, and the RBI Bonds are quoted at 6.5%. Applicable Tax Rate is 40%.

Ascertain — (a) Required return on Equity Shares.

(b) Whether Equity Shares are correctly priced, if PAT is ₹4.20 Crores.

(c) Beta of Assets.

Solution:**1. Required Return on Equity Shares (Under CAPM)**

[Required Return $E(R_E)$]	$= R_F + \beta_E \times \text{Market Risk Premium}$
Risk Free Return (R_F)	$= 6.5\%$
Risk Premium	$= 7.5\%$
Beta of Equity (β_E)	$= 1.50$
Therefore, $E(R_E)$	$= 6.5\% + 1.50 \times 7.5\% = 6.5\% + 11.25\% = 17.75\%$

2. Evaluation of Market Price of Shares of SKY Info Space Ltd

Particulars	Value
Profit After Tax of SKY Info Space Ltd	₹4.20 Crores
No. of Shares Outstanding	5 Lakh Shares
Earnings Per Share [₹4.20 Crores ÷ 5 Lakh Shares]	₹84
Market Price per Share	₹450
Market Expectation (R_E) [A]	18.67%
Expected Return under CAPM [$E(R_E)$] [B]	17.75%
Market Expectation [A] vs. Expected Return under CAPM [B]	[B] is Lower
Inference	Stock gives higher than what it should give
Conclusion [Expected Return is lower than Estimated Return] Share is	Underpriced

3. Beta of Assets of SKY Ltd

- Beta of Assets of SKY Ltd = Beta of SKY Ltd
- Beta of SKY Ltd (Levered Firm) = Weighted Average Beta of Equity and Debt of SKY Ltd
- Therefore, Beta of Assets β_A = Weighted Average Beta of Equity and Debt of SKY Ltd

$$\Rightarrow \text{Beta of Assets } \beta_A = \frac{\beta_{EA} \times \text{Equity}}{\text{Equity} + \text{Debt}(1 - \text{Tax})} + \frac{\beta_{\text{Debt}} \times \text{Debt} \times (1 - \text{Tax})}{\text{Equity} + \text{Debt}(1 - \text{Tax})}$$

$$\beta_E = 1.50$$

$$\beta_D = 0$$

$$\text{Equity} = \text{No. of Shares } 5,00,000 \times \text{Market Price } ₹450 = ₹22.50 \text{ Cr.}$$

$$\text{Debt} = \text{No. of Debentures } 1,00,000 \times \text{Market Price } ₹125 = 1.25 \text{ Cr.}$$

$$\text{Tax} = 40\% \text{ or } 0.40$$

$$\begin{aligned} \text{Market Price of Debt} &= \text{Face Value } ₹100 \times \text{Return on Face Value } 15\% \div \text{Mkt. Expectation } 12\% \\ &= ₹125.00 \end{aligned}$$

$$\beta_A = \frac{\beta_{EA} \times \text{Equity}}{\text{Equity} + \text{Debt}(1 - \text{Tax})} + \frac{\beta_{\text{Debt}} \times \text{Debt} \times (1 - \text{Tax})}{\text{Equity} + \text{Debt}(1 - \text{Tax})}$$

$$\Rightarrow \beta_A = \text{Equity Beta } (\beta_E) \times \text{Equity} \div [\text{Equity} + \text{Debt} \times (1 - \text{Tax})] + 0$$

$$= 1.50 \times 22.50 \div [22.50 + 1.25 \times (1 - 0.40)]$$

$$= 33.75 \div [22.50 + 1.25 \times 0.60]$$

$$= 33.75 \div [22.50 + 0.75] = 33.75 \div 23.25 = 1.45$$

Therefore, Beta of the Assets of SKY Ltd is 1.45.

Illustration 52.

Somnath Clothing Mills (SCM) is planning to foray into the business of establishing and running malls all around India, as it sees tremendous opportunity in that area. Presently, only one Company (OSS Bazaar Ltd) is in that line, establishing malls of size comparable to SCM proposed malls.

The cost of establishing a single mall, on an average, works out to ₹135 Crores. It has ascertained the estimated operating cash inflows from each of those malls.

SCM's share is quoted at ₹540, its equilibrium price, for a return of ₹81 (for both Dividends and Capital Appreciation). SCM's share has a Beta of 1.50. Its Capital Structure is 40% Equity: 60% Debt, and applies this measure to each of its projects / business. Average Tax rate as applicable to SCM is 35%.

Particulars relating to OSS Bazaar Ltd are — (a) Equity Beta of 1.85; (b) Capital for its projects financed 40% by Debt; (c) Effective Tax Rate - 20% [Government has provided tax sops to companies engaged in establishing malls]

The Company's management is at a loss as to what discount rate should be applied for undertaking a financial feasibility study. Recommend the appropriate discount rate if the Risk Free Rate of Return is 6%, Cost of Debt is 10% (not carrying any risk factor).

Solution:

Flow:

- Calculation of Project Beta based on particulars of OSS Bazaar
- Project Beta of OSS Bazaar = Project Beta of SCM's Mall Business
- Ascertain Equity Beta of Mall Business.
- Ascertain Expected Equity Return of SCM on Mall Business
- Calculated Weighted Average Cost of Capital of Mall Business.

1. Calculation of Project Beta (Beta of Mall Business)

Note: For Computing Project Beta, beta of a comparable project only should be considered. Therefore, Beta of Mall Business of SCM should be ascertained from the figures of OSS Bazaar Ltd and not the particulars of SCM's Clothing Mill Business.

(a) Beta of OSS Ltd

Beta of Mall Business $\beta_{MALL} = \text{Beta of OSS Bazaar Ltd } (\beta_{OSS})$

$\beta_{OSS} = \text{Weighted Average Beta of Equity and Debt}$

$$\Rightarrow \beta_{OSS} = \beta_{OSS - \text{equity}} \times \text{Equity} \div [\text{Equity} + \text{Debt} \times (1 - \text{Tax Rate})]$$

$$\beta_{OSS - \text{equity}} = 1.85$$

$$\text{Debt} = 40\% \text{ of Value} = 0.40$$

$$\text{Equity} = 1 - \text{Debt} = 1 - 0.40 = 0.60$$

$$\text{Beta of Debt } \beta_D = 0 \text{ (Debt does not carry any Risk).}$$

$$\text{Tax Rate} = 20\% = 0.20$$

$$1 - \text{Tax} = 1 - 0.20 = 0.80$$

$$\beta_A = \frac{\beta_{EA} \times \text{Equity}}{\text{Equity} + \text{Debt}(1 - \text{Tax})} + \frac{\beta_{\text{Debt}} \times \text{Debt} \times (1 - \text{Tax})}{\text{Equity} + \text{Debt}(1 - \text{Tax})}$$

$$\begin{aligned} \text{Therefore, } \beta_{OSS} &= \beta_{OSS - \text{equity}} \times \text{Equity} \div [\text{Equity} + \text{Debt} \times (1 - \text{Tax Rate})] + 0 \\ &= 1.85 \times 0.60 \div [0.60 + (0.40 \times 0.80)] \\ &= 1.11 \div [0.60 + 0.32] \\ &= 1.11 \div 0.92 = 1.207 \end{aligned}$$

(b) Beta of Mall Business

$$\beta_{MALL} = \beta_{OSS}$$

$$\text{Therefore, Beta of Mall Business } (\beta_{MALL}) = 1.207$$

2. Calculation of Equity Beta of SCM's Mall Business

$$\beta_A = \frac{\beta_{EA} \times \text{Equity}}{\text{Equity} + \text{Debt}(1 - \text{Tax})} + \frac{\beta_{\text{Debt}} \times \text{Debt} \times (1 - \text{Tax})}{\text{Equity} + \text{Debt}(1 - \text{Tax})}$$

$$\beta_{MALL} = \beta_{SCM - \text{EQUITY}} \times \text{Equity} \div [\text{Equity} + \text{Debt} \times (1 - \text{Tax Rate})] + 0$$

$$\beta_{MALL} = 1.207$$

$$\text{Debt} = 60\% \text{ of Value} = 0.60$$

$$\text{Equity} = 40\% \text{ of Value} = 0.40$$

$$\text{Tax Rate} = 20\% = 0.20$$

$$1 - \text{Tax} = 1 - 0.20 = 0.80$$

$$\begin{aligned} \Rightarrow 1.207 &= \beta_{SCM - \text{EQUITY}} \times 0.40 \div [0.40 + (0.60 \times 0.80)] \\ &= \beta_{SCM - \text{EQUITY}} \times 0.40 \div [0.40 + 0.48] \\ &= \beta_{SCM - \text{EQUITY}} \times 0.40 \div 0.88 \\ &= \beta_{SCM - \text{EQUITY}} \times 0.455 \end{aligned}$$

$$\Rightarrow \beta_{SCM - \text{EQUITY}} = 1.207 \div 0.455 = 2.65$$

3. Calculation of Equity Expected Return [$R_{E-SCM-MALL}$] on SCM's Mall Business

(Under CAPM)

(a) Calculation of Equity Return of SCM's Cloth Business under CAPM [$E(R_{E-SCM-CLOTH})$]

Particulars	Value
Return on Equity of SCM's Cloth Business	₹81
Market Price of Equity Share of SCM	₹540
Return on Equity Share of SCM [$₹81 \div ₹540$]	15%
Since Market Price is in Equilibrium, Expected Return under CAPM = Actual Return	15%

(b) Calculation of Market Return [R_M]

$$\text{Expected Return under CAPM } [E(R_{E-SCM-CLOTH})] = R_F + [\beta_{E-SCM-CLOTH} \times (R_M - R_F)]$$

$$\Rightarrow 15\% = 6\% + 1.50 \times (R_M - 6\%)$$

$$15\% - 6\% = 1.50 \times (R_M - 6\%)$$

$$\Rightarrow R_M - 6\% = 9\% \div 1.50$$

$$\Rightarrow R_M = 6\% + 6\% = 12\%$$

(c) Calculation of Equity Expected Return on SCM's Mall Business [$R_{E-SCM-MALL}$]

$$\text{Expected Return under CAPM } [E(R_{E-SCM-MALL})] = R_F + [\beta_{E-SCM-MALL} \times (R_M - R_F)]$$

$$\Rightarrow E(R_{E-SCM-MALL}) = 6\% + 2.65 \times (12\% - 6\%)$$

$$= 6\% + 2.65 \times 6\%$$

$$= 21.90\%$$

4. Calculation of Weighted Average Cost of Capital of SCM's Mall Business

Source of Fund	Weight	Cost [Net of Tax]	Weighted Cost
(1)	(2)	(3)	(4) = (2)X(3)
Debt	0.60	8% [10% x (1 - Tax 20%) = 10% x 0.80]	4.80%
Equity	0.40	21.90%	8.76%
	1.00	Weighted Average Cost of Capital	13.56%

Conclusion: Appropriate Discount Rate for evaluating the financial feasibility of the project is the Weighted Average Cost of Capital of 13.56%.

Illustration 53.

ABC is at present engaged in production of sport shoes and has a debt equity ratio of 0.80. Its present cost of debt funds is 14 % and it has a marginal tax rate of 60 per cent. The company is proposing to diversify to a new field of adhesives which is considerably different from the present line of operations. ABC Ltd., is not well conversant with the new field. The company is not aware of risk involved in area of adhesives but there exists another company STP, which is a representative company in adhesives. STP is also a public limited company whose shares are traded in the market. STP has a debt to equity ratio of 0.25, a beta of 1.15 and an effective tax rate of 40 per cent.

- (a) Calculate what systematic risk is involved for ABC Ltd., if the company enters into the business of adhesives. You may assume CAPM holds and ABC employs same amount of leverage.

- (b) In case risk free rate at present is 12 per cent and expected return on market Portfolio is 15% what return ABC Ltd., should require for the new business if it uses a CAPM approach.

Solution:

Basic Data for Computation of Beta

β_E of STP Ltd	1.15
Debt Equity Ratio of ABC Ltd	0.80
Debt Equity Ratio of STP Ltd	0.25
Cost of Debt	14%

Note: It is assumed that debt is Risk - free.

1. Asset Beta of STP Ltd.

$$\begin{aligned}\beta_A &= [\beta_E \times E / (E + D \times (1 - \text{Tax})) + [\beta_D \times D \times (1 - \text{Tax}) / E + D \times (1 - \text{Tax})]] \\ &= [1.15 \times 1 \div (1 + 0.25 \times (1 - 0.40))] + 0 \\ &= 1.00\end{aligned}$$

2. Equity Beta of ABC Ltd.

$$\begin{aligned}\beta_A &= [\beta_E \times E / (E + D \times (1 - \text{Tax})) + [\beta_D \times D \times (1 - \text{Tax}) / E + D \times (1 - \text{Tax})]] \\ 1.00 &= [\beta_E \times 1 / (1 + 0.80 \times (1 - 0.60))] \\ \beta_E &= 1 \times (1 + 0.80 \times 0.4) \\ &= 1.32\end{aligned}$$

3. Computation of Cost of Equity

$$\begin{aligned}K_e &= R_f + \beta (R_m - R_f) \\ &= 12\% + 1.32 \times (15\% - 12\%) = \mathbf{15.96\%}\end{aligned}$$

4. Computation of Cost of Debt

$$\begin{aligned}K_d &= 14 \times (1 - \text{Tax Rate}) \\ &= 14 \times (1 - 0.60) = \mathbf{5.60\%}\end{aligned}$$

5. Weighted Average Required Return for new business

$$\begin{aligned}&= K_e \times \frac{E}{E + D \times (1 - \text{Tax})} + K_d \times \frac{D \times (1 - \text{Tax})}{E + D \times (1 - \text{Tax})} \\ &= 15.96 \times \frac{1}{1 + 0.80 \times (1 - 0.60)} + 5.60 \times \frac{0.80 \times (1 - 0.60)}{1 + 0.80 \times (1 - 0.60)} \\ &= \mathbf{13.44\%}.\end{aligned}$$



Section D

Investment Decisions



Study Note - 10

INVESTMENT DECISIONS UNDER UNCERTAINTY



This Study Note includes

10.1 Investment Decisions Under Uncertainty

10.2 Investment in Advanced Technological Environment

10.3 International Investments

10.1 INVESTMENT DECISIONS UNDER UNCERTAINTY

Investment policy has been central to economic theory and practice for over 200 years. Alfred Marshall first formulated investment decision criterion as a “net present value” rule, where investment cost is compared to the present value of certain cash flows that result from investment. More recently, the Marshallian approach has been extended to encompass uncertainty with respect to future investment productivity. Expected cash flows are discounted at a rate that is adjusted for systematic project risk. Only the systematic risk component of total uncertainty is predicted to shift the demand schedule, since non-systematic risk is diversifiable and hence not priced in equilibrium. In the neoclassical view, supply is thought to be independent of risk except as channeled through developed asset price. This implies that the investment hurdle value (analogous to Tobin's (1969) q) is unaffected by risk, since value associated with waiting to resolve future uncertainty is irrelevant.

Beginning with Keynes (1936), economists have expressed various degrees of concern with ignoring the timing effects of uncertainty on real investment. Indeed, for there to be no possible benefit associated with waiting to invest, it must be that:

- (i) Investment is completely reversible or
- (ii) Investment cannot be delayed.

Complete reversibility suggests that physical and financial resources are fully recoverable at any time after investment. The ability to swap the ongoing cash flows from investment—at zero cost and at any time—for the original investment cost amount is clearly unrealistic for most types of investments. The alternative extreme assumption of irreversible investment implies that investment cost is sunk once investment is undertaken. Although many investments are not completely irreversible, positive (ex post) adjustment costs often result in investment that is effectively irreversible (Dixit (1989), Grenadier (1995), Childs et. al. (1996)).

The second requirement of inflexible investment timing is also typically unrealistic, and would require circumstances such as perfect industry competition (Leahy (1993), Dixit and Pindyck (1994)), first-mover advantages and entry deterrence in imperfectly competitive markets (Spence (1977)), or the imminent threat of the taking of investment rights through regulation (Riddiough (1997)). Many real investments are protected from these “now-or-never” investment forces due to, for example, proprietary R&D effort, spatial-product differentiation, and well protected property rights. Irreversibility and timing flexibility are therefore common characteristics of many investment opportunities, thus violating assumptions underlying the neoclassical investment criterion.

A vast amount of theoretical work has been done in recent years to extend the neoclassical investment model to account for irreversibility and delay. Arrow and Fisher (1974), Henry (1974a, 1974b) and Bernanke (1983), among others, correctly recognize that the (ex ante) payoff function to irreversible investment is generally convex due to the ability to wait to invest in order to avoid low value realizations. Increases in total price uncertainty therefore increase investment option value due to Jensen's inequality.

Significantly, the threshold value for investment must also be modified to account for the fact that irreversible investment eliminates option value associated with waiting to invest.

Bernanke refers to the increase in the option-based investment hurdle as the “bad news principle,” in which the developer has an incentive to wait to reduce the odds of making an ex post regrettable investment decision.

The channels through which uncertainty affects investment therefore differ in the neoclassical versus option-based investment models. In both models, an increase in *systematic* investment risk will typically increase the rate at which expected cash flows are discounted to decrease investment value. All else equal the threshold investment value (cost) remains constant in the neoclassical model, resulting in a demand-induced decline in the rate of investment. Alternatively, *total* investment risk is also predicted to impact investment behavior in the option-based investor model. The ability to delay investment suggests that an increase in total risk shifts the supply schedule leftward to decrease the rate of investment—an effect that is incremental to the asset price effect.

Although both the neoclassical and option-based models of investment are well developed theoretically, relatively little empirical research has focused on differentiating between these models. An exception is a recent paper by Leahy and Whited (1996), who furnish evidence supporting the option-based investment model. Using panel data on publicly traded firms from a variety of industries, the authors regress periodic real investment on Tobin's, total uncertainty and a CAPM-based measure of systematic risk. They find evidence that the relationship between total risk and investment is statistically significant and inverse, and that total risk is more important than systematic risk as a determinant of investment. This leads the authors to conclude that:

These results argue in favor of theories in which uncertainty affects investment directly rather than working through covariances, and in favor of models in which the marginal revenue product of capital is concave. This leaves irreversibilities as the most likely explanation of the relationship between investment and uncertainty. [Leahy and Whited, p.66]

In this paper we provide further evidence on the role of uncertainty in investment by focusing on a particular class of real assets: commercial real estate. Besides being a large and important asset type (there is estimated to be over \$5 trillion of commercial real estate in the U.S.), focusing on a single, capital-intensive industry offers several advantages in a test of alternative investment models. First, data aggregation problems are often less severe and the determinants of asset price and real investment are probably more homogeneous—and therefore more easily specified—within a particular industry. Furthermore, commercial real estate is fixed in location, is highly durable and is relatively insensitive to non-capital factors of production. Irreversibility is therefore likely to be an important investment characteristic, which suggests that commercial real estate sector is an attractive natural laboratory to contrast the option-based investment model with the neoclassical investment model.

We take a somewhat different approach than Leahy and Whited (1996) in constructing our test of alternative investment models. First, in addition to uncertainty, we explicitly control for several other factors that are predicted to affect investment—including interest rate, construction cost and expected growth rate of asset cash flows. Furthermore, we explicitly model asset market equilibrium by specifying a structural equation model in which built asset price and aggregate investment are simultaneously determined.

Taking a structural modeling approach—as opposed to expressing investment as a reduced form—allows us to better isolate the supply and demand channels through which uncertainty impacts investment.

Why Uncertainty?

In practice there is always uncertainty about the future. It will rarely, if ever, turn out that events occur exactly as forecast. The project evaluator and the decision maker must be realistic. Usually, their knowledge of the future, and very often even of the present, is imperfect. Each decision taken now is a product of a set of assumptions concerning the future, about political and social developments,



technological developments, the behaviour of prices of inputs and outputs and so on. The uncertainty moreover is worsened by the fact that forecasts are often based on an imperfect knowledge of economic conditions. Even the most modern techniques of economic forecasting cannot eliminate the uncertainty of many factors affecting investment projects.

Virtually all investment decisions are made under conditions of some uncertainty. When the decision maker assesses the desirability of a project, he evaluates, consciously or unconsciously, the element of uncertainty inherent in the project, converts this into known risks and decides whether the probability of these risks renders the project acceptable or not.

The future is always uncertain. A good choice between projects cannot be made simply on the basis of net present value or net national value added figures without account being taken of how uncertain these calculations are for the alternative projects.

Sources of Uncertainty

Each basic variable entering the calculation of commercial or national profitability could be a source of uncertainty of greater or lesser importance. Some variables are common sources of uncertainty in evaluating investment projects. These are, size of investment, operating costs and sales revenue. Each is composed of a quantity and a price. In addition, since time is a key element in investment planning, the phasing of a project may prove to be critical to its evaluation. Uncertainties concerning discount rates may also be of crucial importance in project evaluation.

A major task of the evaluator is to identify the key variables to which he should apply uncertainty analysis.

It is important to distinguish between uncertainties relating to the project itself and uncertainties relating to the environment in which it operates. These two sources of uncertainty usually act together in practice.

Causes of Uncertainty

Uncertainty usually arises because it is impossible to predict the different variables and, consequently, the magnitudes of benefits and costs exactly as they will occur. One hundred per cent predictability in project analysis is not feasible for many reasons, the most important being

- (a) Inflation, by which it is understood that the prices of most items, inputs or outputs, increase with time, causing changes in relative prices. The exact magnitude of price increases will always be unknown. Prices may change upwards or downwards for other reasons, too.
- (b) Changes in technology, quantities and qualities of inputs and outputs used for project evaluation are estimated according to the present state of knowledge, yet new technologies might be introduced in the future that would alter these estimates.
- (c) The rated capacity used in project evaluation may never be attained. This in turn will affect operating costs as well as sales revenue.
- (d) It often turns out that the needed investment for both fixed and working capital is underestimated and that the construction and running-in periods are considerably longer than expected. This affects the size of investment, operating costs and sales revenue.

Some uncertainties are outside the control of planners, others can be influenced by their policies. The extent of risk associated with an investment project may be reduced either by making advance arrangements for dealing with uncertainty or by substituting a less risky alternative for a more risky one.

10.1.1 Uncertainty Analysis

Methods for assessing the soundness of a project from both the commercial and national point of view have been outlined in the preceding sections. The procedure for applying uncertainty analysis is basically the same for all these methods. Simple uncertainty analysis is applied to some selected methods of

determining commercial and national profitability in the sections that follow. The *break-even analysis* is recommended as a first step. A second step proposed is the *sensitivity analysis* whereby instead of using one estimate of each variable several estimates are used under varying conditions. Finally, the authors recommend the *probability analysis* in which all the probable values of each variable that have a significant chance of occurrence are used. It is up to the evaluator to decide how far to go in uncertainty analysis in order to verify the calculations obtained under deterministic conditions.

The application of sensitivity analysis is illustrated on the basis of the net present value method. The same procedure would apply to the net value added.

Probability analysis is applied to the pay-back period as representative of the commercial profitability methods and to value added (absolute efficiency formula) as representative of national profitability analysis.

Before embarking on the uncertainty analysis of an investment project the evaluator should examine carefully whether it is indispensable. Uncertainty analysis, and particularly probability analysis, requires a great deal of computation which should be avoided if possible. An evaluator is advised therefore to carry out probability analysis only under conditions of great uncertainty regarding the future operation of a project.

10.1.2 Estimation of Projected Cash Flow

Principle involved in the estimation of Project Cash Flows. The estimation involves the following principles:

Principle	Description
1. Incremental Approach	Cash Flows are to be estimated in incremental terms, i.e. difference between the Cash Flows of the Firm "without the project" and "with the project".
2. Long Term Funds Approach	Cash Flows should be assessed from the "Total Long-Term Funds" viewpoint, i.e. total of Debt, Preference and Equity Funds.
3. Exclusion of Financing Costs	Since the Cost of Capital used for discounting purposes includes the cost associated with Debt, Preference and Equity components of Capital, Interest on Debt and Dividends (Equity and Preference) are not considered as Cash Outflows / Expenses in the estimation.
4. Post Tax Concept	Cash Flows are to be defined in post-tax terms. Also, the Cost of Capital used for discounting should be computed in post-tax terms.

10.1.3 Relevant Cost Analysis

Relevant Cost Analysis

For decision making purpose, it is necessary to classify costs and revenues based on whether they are relevant or irrelevant to the decisions. Relevant costs and revenues are those, that are influenced by the decisions. Irrelevant costs and revenues are those, that are not affected or influenced by the decisions.

Relevant costs are those expected future costs that are essential but differ for alternative courses of action. It is a future cost that would arise as a direct consequence of the decision under review.

Relevant costing is a management accounting toolkit that helps managers reach decisions when they are posed with the following questions:

1. Whether to buy a component from an external vendor or manufacture it in house?
2. Whether to accept a special order?
3. What price to charge on a special order?
4. Whether to discontinue a product line?



5. How to utilize the scarce resource optimally?, etc.

Relevant costing is an incremental analysis which means that it considers only relevant costs i.e. costs that differ between alternatives and ignores sunk costs i.e. costs which have been incurred, which cannot be changed and hence are irrelevant to the scenario.

The costs which should be used for decision making are often referred to as "relevant costs". CIMA defines relevant costs as 'costs appropriate to aiding the making of specific management decisions'.

To affect a decision a cost must be:

- (a) Future: Past costs are irrelevant, as we cannot affect them by current decisions and they are common to all alternatives that we may choose.
- (b) Incremental: 'Meaning, expenditure which will be incurred or avoided as a result of making a decision. Any costs which would be incurred whether or not the decision is made are not said to be incremental to the decision.
- (c) Cash flow: Expenses such as depreciation are not cash flows and are therefore not relevant. Similarly, the book value of existing equipment is irrelevant, but the disposal value is relevant.

Example

Company A manufactures bicycles. It can produce 1,000 units in a month for a fixed cost of ₹300,000 and variable cost of ₹500 per unit. Its current demand is 600 units which it sells at ₹1,000 per unit. It is approached by Company B for an order of 200 units at ₹700 per unit. Should the company accept the order?

Solution

A layman would reject the order because he would think that the order is leading to loss of ₹100 per unit assuming that the total cost per unit is ₹800 (fixed cost of ₹300,000/1,000 and variable cost of ₹500 as compared to revenue of ₹700).

On the other hand, a management accountant will go ahead with the order because in his opinion the special order will yield ₹200 per unit. He knows that the fixed cost of ₹300,000 is irrelevant because it is going to be incurred regardless of whether the order is accepted or not. Effectively, the additional cost which Company A would have to incur is the variable cost of ₹500 per unit. Hence, the order will yield ₹200 per unit (₹700 minus ₹500 of variable cost).

Normally, the following are relevant Costs:

Differential Cost

- ❖ A differential cost is the difference in cost items under two or more decision alternatives specifically two different projects or situations. Where same item with the same amount appears in all alternatives, it is irrelevant. For example, a plot of land can be used for a shopping mall or entertainment park.
- ❖ The plot is irrelevant since it would be used in both the cases. Similarly, future costs and benefits that are identical across all decision alternatives are not relevant.
- ❖ An example of differential cost would be of a company which is selling its products through distributors. It is paying them a commission of ₹16 million. Any alternate which costs lesser would be considered. Let us suppose that the company is planning to appoint salespersons to sell its products and cancels the contracts with distributors. In this case, the selling expense is expected to be to ₹12 million. There is cost differential ₹4 million (₹16 m - 12m). This a good sign but the risk would have to considered for changing the channel of distribution. If there is low risk, it would be prudent to go for own arrangements for sales.

- ❖ Differential costs must be compared to differential revenues. In case, switching over to direct sales bring additional revenues of ₹2 million, it would increase the net benefit to ₹6 million. This would provide more comfort to the decision maker while considering a change in the distribution channel.

Incremental or Marginal Cost

- ❖ Where as differential cost is a difference between the cost of two independent alternatives, incremental or marginal cost is a cost associated with producing an additional unit. In case of a university, it could be cost of admitting another student. Even operating a second shift is an example of incremental cost. It would be noted that the two decisions are not independent as second shift depends upon first shift.
- ❖ Incremental cost must be compared with incremental revenues to arrive at a decision.

Opportunity Cost

- ❖ It is cost of opportunity foregone. Mr. Ahmed Shah left a bank job which was paying him ₹15,000 per month and got admission in a University. Monthly fee-charge in the university is ₹10,000 per month. For Ahmed Shah, this would be ₹25,000 per month (₹10,000 + ₹15,000).
- ❖ Farhana is a fresh graduate from a business university. She got two offers, one of ₹25,000 from an investment bank and another of ₹15,000 for a teaching-assistant in a university. Another of her classfellow, Shabana got the same offer from the same university. While Shabana would be happy to join the university, Faraha would not be as she would lose an opportunity to serve at the bank for ₹25,000.
- ❖ Whenever an organization is deciding to go for a particular project, it should not ignore opportunities for other projects. It should consider :

- (1) what alternative opportunities are there?
- (2) Which is the best of these alternative opportunities?

Avoidable Costs

These are costs that can be eliminated in whole or in part by choosing one alternative over another. Avoidable costs are relevant costs.

Replacement Cost:

It is the cost at which there could be purchase of an asset or material identical to that which is being replaced or revalued. It is the cost of replacement at current market price and is relevant for decision-making.

Imputed Costs

These are Notional Costs appearing in the Cost Accounts only e.g. notional rent charges, interest on capital for which no interest has actually been paid. These are relevant costs for decision-making. Where alternative capital investment projects are being evaluated, it is necessary to consider the imputed interest on capital before a decision is arrived at as to which is the most profitable project.

Out-of-Pocket Cost

These are costs that entail current or near future cash outlays for the decision at hand. Such costs are relevant for decision - making, as these will occur in near future. This cost concept is a short-run concept and is used in decisions on fixing Selling Price in recession, Make or Buy, etc. Out-of-Pocket costs can be avoided or saved if a particular proposal under consideration is not accepted.



Irrelevant Costs

Sunk costs are past costs. These cannot be changed with any future decision. Suppose, a piece of land has already been purchased by a company for a sum of ₹30 million. Also suppose, the company is consider covering it with a wall which would cost Rupees two million. While the sum of ₹30 million is a sunk cost, the other of ₹2 million is a future cost or out of pocket expenses. It is relevant to decision: whether to erect a wall now or postpone it for the next month, whether it should be two-meter or three-meter high. Whether a wall is erected or not and, if erected, whether it is 2 or 3 meter, the sum of ₹30 million for land would remain the same. It is a sunk cost and therefore irrelevant to the decision. Similarly, a cost which is identical in all decisions is irrelevant.

Special Decisions

There are special decisions where relevant costs and benefits are to identified before proceeding further. Such decisions are:

- ❖ Accept or reject an order when there is excess capacity
- ❖ Accepting or reject another when there is no excess capacity
- ❖ Outsource a product or service
- ❖ Add, drop a product, service or department
- ❖ Sell or process further
- ❖ Optimization of limited resources or working under constraint.

Sunk Costs

Sunk costs are costs that were incurred in the past. **Committed costs** are costs that will occur in the future, but that cannot be changed. As a practical matter, sunk costs and committed costs are equivalent with respect to their decision-relevance; neither is relevant with respect to any decision, because neither can be changed. Sometimes, accountants use the term "sunk costs" to encompass committed costs as well.

Experiments have been conducted that identify situations in which individuals, including professional managers, incorporate sunk costs in their decisions. One common example from business is that a manager will often continue to support a project that the manager initiated, long after any objective examination of the project seems to indicate that the best course of action is to abandon it. A possible explanation for why managers exhibit this behavior is that there may be negative repercussions to poor decisions, and the manager might prefer to attempt to make the project *look* successful, than to admit to a mistake.

Some of us seem inclined to consider sunk costs in many personal situations, even though economic theory is clear that it is irrational to do so. For example, if you have purchased a nonrefundable ticket to a concert, and you are feeling ill, you might attend the concert anyway because you do not want the ticket to go to waste. However, the money spent to buy the ticket is sunk, and the cost of the ticket is entirely irrelevant, whether it cost ₹5 or ₹100. The only relevant consideration is whether you would derive more pleasure from attending the concert or staying home on the evening of the concert.

Here is another example. Consider a student who is between her junior and senior year in college, deciding whether to complete her degree. From a financial point of view (ignoring nonfinancial factors) her situation is as follows. She has paid for three years of tuition. She can pay for one more year of tuition and earn her degree, or she can drop out of school. If her market value is greater with the degree than without the degree, then her decision should depend on the cost of tuition for next year and the opportunity cost of lost earnings related to one more year of school, on the one hand; and the increased earnings throughout her career that are made possible by having a college degree, on the other hand.

In making this comparison, the tuition paid for her first three years is a sunk cost, and it is entirely irrelevant to her decision. In fact, consider three individuals who all face this same decision, but one paid ₹24,000 for three years of in-state tuition, one paid ₹48,000 for out-of-state tuition, and one paid nothing because she had a scholarship for three years. Now assume that the student who paid out-of-state tuition qualifies for in-state tuition for her last year, and the student who had the three-year scholarship now must pay in-state tuition for her last year. Although these three students have paid significantly different amounts for three years of college (₹0, ₹24,000 and ₹48,000), all of those expenditures are sunk and irrelevant, and they all face exactly the same decision with respect to whether to attend one more year to complete their degrees. It would be wrong to reason that the student who paid ₹48,000 should be more likely to stay and finish, than the student who had the scholarship.

Absorbed Fixed Cost: Fixed Costs which do not change due to increase or decrease in activity is irrelevant for decision-making. Although Fixed Costs are absorbed in cost of production on a normal rate, they are irrelevant for managerial decision-making. However if Fixed Costs are specific, they become relevant for decision-making.

Fixed Costs are unrelated to output and are generally irrelevant for decision-making purpose. However, in the following circumstances, Fixed Costs become relevant for decision-making -

1. When Fixed Costs are specifically incurred for any contract,
2. When Fixed Costs are incremental in nature.
3. When the fixed portion of Semi-Variable Cost increases due to change in level of activity consequent to acceptance of a contract.
4. When Fixed Costs are avoidable or discretionary,
5. When Fixed Costs are such that one cost is incurred in lieu of another (the difference in costs will be relevant for decision-making.)

Relevant Cost for Material

Case-1	Opportunity Cost of Material already purchased and having no other use in current production process and having No Realisable Value.	Nil
Case-2	Opportunity Cost of Material already purchased and having no other use in current production process but having Realisable Value.	Opportunity Cost of the Material i.e., Best Alternative Use
Case-3	Opportunity Cost of Material required under proposed production. Only some portion thereof is held in stock out of purchase and having no other use in current production process but having Realisable Value.	Realisable Value
Case-4	Opportunity Cost of Material already Purchased and held in Godown and having Regular Use in current production process.	Replacement Cost i.e., Current Purchase Price
Case-5	Opportunity Cost of Material already Purchased and held in Godown and having Regular Use in current production process as a substitute Material.	Replacement Cost i.e., Current Purchase Price
Case-6	Opportunity Cost of Material already purchased and having no other use in current production process and having No Realisable Value but can be disposed by incurring some additional cost.	Saving in Additional Disposal Cost i.e., Benefit or (-) Cost.



Case-7	Opportunity Cost of Material (Say A) already purchased that can be used after suitable alteration in place of other material (Say B) or can be disposed off.	(a) Resale Value of Material A or (b) Current Purchase Price of Material B – Alteration cost of Material A. Whichever is higher

Instead of all the above 7 cases remember: -

Already purchased Material not used in Regular Production Process	• The maximum Benefit you can drive from the Material is the Opportunity Cost. (for other than using in an offer) • If used in Offer the Old Purchase Price.
Material used in Regular Production Process or Material required to be purchased for the offer.	Current Purchase Price

Labour

Labour is of two types: -

(1) Casual Labour

- It means Temporary Labour.
- Payment according to work only.
- It may be Idle or Busy (if Busy it means Short Supply)

(2) Permanent Labour

- Those Labour to whom the management could not reduce, retrench, terminate, due to an agreement with labour.
- Agreed Labour payment irrespective of work.
- It may be Idle or Busy

Relevant Cost of Labour

	Idle	Busy
Casual	Cost to be incurred	Cost to be incurred + Contribution Lost
Permanent	Nil	Benefit Lost (ignoring Sunk Cost)

Relevant Cost of Machines

Machine	Relevant Cost
Useless	Difference of Resale Value
Regular Use	Difference of Replacement Cost

Example-1

Machine (Original Cost)	₹100000
Life of Machine	5 Years
WDV	Nil
Resale Value	₹10000
No other use of the machine.	

Offer: To use the machine for construction of a Guest House for 1 year. Resale Value after 1 year is ₹1,000. Find out the Opportunity Cost of Machine.

Solution.

- Relevant Cost of utilising machine in order to complete the offer is ₹ 9,000 (10,000 – 1,000), that is benefit lost due to acceptance of offer.
- If the machine has no other use then Relevant Cost is difference of Resale Value.

Example-2 – (Relevant cost of machines which are in Regular Use)

The Company has M1 type of Machines which are of regular use. The company receives an offer for construction of guest house. The Company requires M1 type of machine.

- Current Purchase Price of Machine at beginning of the Year ₹100000.
- Such machine shall be transferred to regular work at ₹ 90000 at the end of work of offer.

Solution.

Cost to be incurred	100000
(-) Transferred Cost	90000
Difference of Replacement Cost (1,00,000-90,000)	10000

Fixed Overheads

- (1) Avoidable Fixed Costs** are always relevant for the decision (cost to be incurred) like extra machine rent, extra supervisor salary.
- (2) Unavoidable Fixed Costs:** Always to be ignored due to Sunk Cost (future obligation already decided).
 - ❖ Change in apportionment does not change in cash outflow.
 - ❖ For **Decision Making** Fixed Costs are always to be expressed in totality instead of unit wise.

Variable Overheads

- Variable Overheads to be incurred due to acceptance of offer, hence relevant for decision making.
- If Variable Overheads include **Indirect Material, Indirect Labour** then such Variable Overheads to be linked with **Production**.
- If Variable Overheads include **Indirect Expenses** (Power, Electricity, Energy) then Variable Overheads always linked with **Working Hours**.
- If the break-up of Variable Overheads are not given in question then always presume Variable Overheads include Indirect Expenses like power, electricity, **based on hours**.



If the Question is silent about nature of Resources: -		
(i)	Material	Slow Moving
(ii)	Labour	Casual
(iii)	Casual + Busy	Short Supply
(iv)	Overheads	Fixed – Unavoidable (allocated, absorbed, recovered, apportioned, added to products, General Overheads)

Drawings and Design

- ❖ If the drawings and design relates to the machine then such drawings and design to be termed as marketable.
- ❖ If the drawing and design relates to the infrastructure then such drawings and design can not be termed as marketable.

Depreciation

- ❖ If offer consumes a substantial part of machine then existing machine not to be utilised for completion of offer. Hence we can say that in order to complete the order, fresh new machine to be purchased from market.
- ❖ And after completing the offer such new machine either to be sold or transferred to regular stock.
- ❖ If offer does not consume substantial part of the machine then no part of depreciation to be charged from offer.

Profit Centre

- ❖ Profit Centre means a unit of organisation in which profit earned on “regular basis”.
- ❖ In other words we can say profit earned only when actual output is more than Break-Even Level of output.
- ❖ Simply we presume Actual Output always = 100% capacity which means if any Department of Company to be a Profit Centre then say they are utilising 100% resources at Regular Basis. (No spare Capacity).

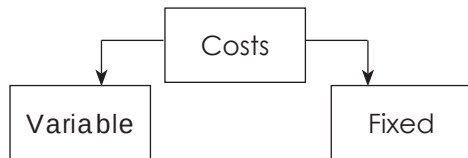
Example-1		Example-2	
Company		Company	
A.O. > BEP (A.O. = 100% Capacity)		Profit Centre	
Profit Centre		A.O. > BEP (A.O. < 100%, say 80%)	
Offer		Offer for less than 20% units	
Charge: - Variable Cost (+) Cont. Lost		Charge: - Variable Cost	
	XXX XXX XXX		XXX XXX

- ❖ Relevant Cost in case of Profit Centre comes to Variable Cost + Contribution Lost
- ❖ Contribution lost means Selling Price – Variable Cost and Contribution Lost does not mean Transfer Price – Variable Cost. Because Transfer Price to be termed as Notional Price.

Cost Centre

Cost Centre

Profit: Irregular Basis



(Relevant Cost) (Unavoidable)

Cost Centre means: -

- Unit of organisation in which the occurrence of profit are not consistence.
- Hence due to acceptance of offer, No Benefit Lost should be considered.
- Only the Cost which we are going to incur (Variable Cost) should be charged from offer.
- ❖ If the nature of a Department is silent then always presume such Department to be a Cost Centre.
- ❖ All the activities of Research and Development Department, Planning, Designing, Engineering to be termed as preceding activity for Costing Division. Hence Cost incurred in these Departments to be termed as **Sunk Cost** in context of Decision Making.

10.1.4 Project Report – Features and Contents

Project Report or Feasibility Report is a written account of various activities to be undertaken by a Firm and their technical, financial, commercial and social viabilities.

Purpose: Project Report states as to what business is intended to be undertaken by the entrepreneur and whether it would be technically possible, financially viable, commercially profitable and socially desirable to do such a business.

(A) Features of a Project Report

(a) Technical Feasibility:

This includes analysis about the technical requirements of the industry in relation to the project in hand and involves a examination of issues like suitability of plant location, adoption of appropriate technology, selection of machinery and plant etc.

(b) Economic, Financial and Commercial Viability:

- ❖ Economic Viability is concerned with a thorough analysis of present and future market prospects for the proposed product and involves the study of possible competitors in the market and the firm's relative cost advantages and disadvantages in relation to them.
- ❖ Financial Viability includes estimation of capital requirements and its cost, computation of operating costs, forecasting of sales revenue, arrangement of credit, measurement of profit, finding out the break-even points, assessment of fixed and variable costs, cash flow estimates, etc.
- ❖ Commercial Viability includes the estimation of the selling problems and profitability of the project. A project must, therefore, be economically, financially and commercially viable.

(c) Social Viability:

- ❖ Business entities depend heavily on specialised Financial Institutions, funded or approved by Government, for procuring finance, Government or its agencies would extend assistance to a business unit only if the proposed project is socially desirable.



- ❖ Social viability becomes necessary for performing the social responsibilities of the Firm. Therefore, at the time of preparing the project report, the social benefits of the project must be analysed well.

(B) Project Report – Contents

Report consists of the following:-

(i) Industry information

- (a) Information about industry and its status in the economy, present production and demand pattern, indicating licensed, installed capacity, Government policies and export potential.
- (b) Broad market trend of the product and by-products within and outside the states / country for 5 years.

(ii) Production process

- (a) Broad description of different Production processes and their relative economies.
- (b) Availability of technical know-how within and outside the country.

(iii) Raw Materials, specifications and quality of raw materials required and their sources of availability.

(iv) Manpower - Availability of skilled labour and other grades of labour to meet the project's requirements.

(v) Resources / Utilities

- (a) Location of Plant, its advantages and justifications.
- (b) Water - requirement of water for process, boiler feed, cooling etc. sources of water available and making it usable for the factory and to townships, etc.
- (c) Power - total power requirements for the factory, specification of power and choice between purchased power and generated power. If power to be generated - total cost of investment, choice of fuel and the cost for fuel available to factory.
- (d) Fuel - its requirement for steam raising or processing source, and price at which it will be available for factory.
- (e) Effluents - type and quality of effluents, their treatment and disposal, investment in the effluent treatment and disposal, approvals from authorities like Pollution Control Board etc.

(vi) Implementation Programme - implementation and construction programme in the form of CPM/ PERT and flow charts indicating critical path and schedules.

(vii) Cost of Project - Expenditure on Land, Buildings, Plant and Machinery, Preliminary Expenses, Contingencies, cost of spares, Commissioning Expenses, Working Capital Margin Requirements.

(viii) Pattern of Finance - Details of capital structure or financing mix broad pattern, Promoter's Contribution, Loan Components, etc.

(ix) Cost of production - project broad pattern for five years vis-a-vis design capacity, Break-Even Point, effect of variation of cost of raw materials, utilities, selling price etc, Price trend of Raw Materials and Finished Goods.

(x) Profitability -

- (a) Profitability for five years after commission of the project should be worked out.
- (b) Cash Flow Statement and pay-back period for the project.

(xi) Organization and management - description of corporate management, Promoter's experience and background, organizational chart, key personnel, delegation of power, and responsibility structure.

Advantages of a Project Report -

- (i) A Project Report lists the objective in various spheres of business and evaluates them from the right perspective.
- (ii) Facilitates planning of business by setting guidelines for future action. The successful implementation of a project depends upon the line of action as suggested in the project report. Besides, comparison of results will depend upon the projected profitability and cash flows, production schedule and targets as laid down in the project report.
- (iii) Identifies constraints on resources viz. manpower, equipment, financial and technological etc. well in advance to take remedial measures in due course of time.
- (iv) Helps in procuring finance from various financial institutions and banks which ask for such detailed information before giving any assistance.
- (v) Provides a framework of the presentation of the information regarding business required by Government for granting licenses, etc.

10.1.5 Project Appraisal – Steps

Project appraisal is a process whereby a lending financial institution makes an independent and objective assessment of the various aspects of an investment proposal, for arriving at a financing decision.

Appraisal exercises are aimed at determining the viability of a project, and sometimes reshape the project so as to upgrade its viability.

Steps in Appraisal: Major steps undertaken by Financial Institutions under project appraisal are —

(a) Promoters' Capacity: Promoters capacity and competence is examined, with reference to their Management Background,

- ❖ Traits as entrepreneurs,
- ❖ Business or industrial experience,
- ❖ Past performance, etc.

Different considerations are applied in the case of new entrepreneurs.

(b) Project Report: Project report must be complete in all aspects so that its appraisal becomes easy and relevant. For this purpose, the project report should be a self-contained study with necessary feasibility report, market surveys, etc.

(c) Viability Test: Viability test of a project is to be carried out by examining the project from different aspects viz. technical, economic, financial, commercial, management, social and other related aspects as discussed below :-

(i) Technical Feasibility

It involves consideration of technical aspects like location and size of the project, availability, quality and cost of services, supplies of raw materials, fuel, power, land, labour, housing, transportation, etc.

(ii) Economic Viability

It is done on the basis of market analysis of the product or service with particular reference to the size of the market, projected growth in market demand, and the market share expected to be captured.

(iii) Financial Viability

It involves evaluation of project cost in the light of period of construction work, provision for cost escalation, timing of raising funds, projected cost of production and profitability, and cash



flow projections, to ensure the potentiality of the project to meet the current and long-term obligations.

(iv) Commercial Viability

This is assessed in terms of the potential demand for the product, estimated sales price, cost structure, the ability of the Firm to achieve the target sales at competitive price, and the intensity of competition.

(v) Management Capability

It is an examination of the track record of Promoters, their background and capabilities, and competence of the management team.

(vi) Social Relevance

Social relevance of a project like conformity with national policies and plant priorities are also important factors to be considered in project appraisal.

(d) Appraisal in Inflationary and Deflationary Situations: Project Appraisal during inflationary and deflationary conditions does not differ materially from that of an appraisal during normal conditions, except that the financial, economic and commercial aspects require to be taken care of:-

❖ Inflationary Situations

❖ Deflationary Situations

(i) Project Cost, prices of raw materials and labour cost will go up. Hence, there would be a decline in the profitability, as the prices of end products are controlled by the Government or market.

(ii) Market may not be prepared to pay a higher price during an inflationary period. Such a situation impairs the financial viability of the project.

(iii) During a recessionary period, the stock of finished goods tends to accumulate resulting in the blocking up of working capital, and thereby contributing to the sickness of the project.

(iv) It is important to take into consideration the economic conditions while appraising a project.

Project Appraisal Under Normal, Inflationary and Deflationary Conditions

Details about the project such as capital cost estimates, profitability projection, selling prices of its products, cost of production, etc. are compiled assuming the current conditions. However, these assumptions made during the normal conditions for the capital cost of project, selling prices, and cost of production etc. may change due to inflation or deflation during the execution period and also after the execution period of the project.

Thus, the projections made about the profitability indices may not hold good. Therefore, for the changes in the conditions and assumptions, a sensitivity analysis is made working out the revised indices for the evaluation of project.

(i) Cost Escalation: It is required to make provisions for cost escalation on all heads of cost, keeping in view the rate of inflation during likely period of delay in project implementation

(ii) Cost of Funds: The various sources of finance should be carefully scrutinized with reference to probable revision in the rate of interest by the lenders and the revision which could be effected in the interest bearing securities to be issued. All these factors will push up the cost of funds for the Firm.

(iii) Adjustment in Projections: Adjustments should be made in profitability and cash flow projections to take care of the inflationary pressures affecting future projections.

(iv) Re-evaluation of Financial Viability:

- (a) The financial viability of the project should be examined at the revised rates and should be assessed with reference to economic justification of the project.
- (b) The appropriate measure for this aspect is the economic rate of return for the project, which will equate the present value of capital expenditures to net cash flows over the life of the project.
- (c) The rate of return should be acceptable which also accommodates the rate of inflation per annum.

(v) Choice of Projects: In an inflationary situation, projects having early pay back periods should be preferred because projects with long payback period are more risky.

(vi) Approaches:

- (a) Adjustment of Cash Flows: Projected Cash flows should be adjusted to an inflation index, recognizing selling price increases and cost increases annually; or
- (b) Adjustment of Cut-Off Rate: "Acceptance Rate" (cut - off) should be adjusted for inflations, retaining cash flow projections at current price levels.

Note: Adjustment in both the cash flows and the cut-off rate should not be done.

10.1.6 Techniques of Project Evaluation

The following are some techniques of Project Evaluation -

- (A) Simple Payback Period.
- (B) Discounted Payback Period.
- (C) Payback Reciprocal.
- (D) Accounting or Average Rate of Return (ARR).
- (E) Net Present Value (NPV) or Discounted Cash Flow (DCF).
- (F) Profitability Index (PI) or Desirability Factor or Benefit-Cost Ratio.
- (G) Internal Rate of Return (IRR) and Modified Internal Rate of Return (MIRR)

(A) Simple Payback Period

Payback period represents the time period required for complete recovery of the initial investment in the project. It is the period within which the total cash inflows from the project equals the cost of investment in the project. The lower the payback period, the better it is, since initial investment is recouped faster.

Example:-

Suppose a project with an initial investment of ₹ 100 Lakhs, yields profit of ₹ 20 Lakhs, after writing off depreciation of ₹ 5 Lakhs per annum. In this case, the payback period is computed as under -

- (i) CFAT per annum = PAT + Depreciation = ₹ 20 + ₹ 5 = ₹ 25 Lakhs.
- (ii) Hence Payback Period = Initial Investment ÷ CFAT per annum = $100 \div 25 = 4$ years.

Procedure for computation of Simple Payback Period:

- (i) Determine the Initial Investment (Cash Outflow) of the Project.
- (ii) Determine the CFAT (Cash Inflows) from the project for various years.
- (iii) Compute Payback Period as under –



Advantages of Payback Period

- (i) This method is simple to understand and easy to operate.
- (ii) it clarifies the concept of profit or surplus. Surplus arises only if the initial investment is fully recovered. Hence, there is no profit on any project unless the payback period is over.
- (iii) When funds are limited, projects having shorter payback periods should be selected, since they can be Mated more number of times.
- (iv) This method is suitable in the case of industries where the risk of technological obsolescence is very high and hence only those projects which have a shorter payback period should be financed.
- (v) This method focusses on projects which generates cash inflows in earlier years, thereby eliminating projects bringing cash inflows in later years. As time period of cash flows increases, risk and uncertainty also increases. Thus payback period tries to eliminate or minimise risk factor.
- (vi) This method promotes liquidity by stressing on projects with earlier cash inflows. This is a very useful evaluation tool in case of liquidity crunch and high cost of capital.
- (vii) The payback period can be compared to a break-even point, the point at which the costs are fully recovered but profits are yet to commence.

Limitations

- (i) It stresses on capital recovery rather than profitability.
- (ii) It does not consider the post— payback cash flows, i.e. returns from the project after its payback period. Hence, it is not a good measure to evaluate where the comparison is between two projects, one involving a long gestation period and the other yielding quick results but only for a short period.
- (iii) This method becomes an inadequate measure of evaluating two projects where the cash inflows are uneven. There may be projects with heavy initial inflows and very less inflows in later years. Other projects with moderately higher but uniform CFAT may be rejected because of longer payback.
- (iv) This method ignores the time value of money. Cash flows occurring at all points of time are treated equally. This goes against the basic principle of financial analysis which stipulates compounding or discounting of cash flows when they arise at different points of time.

(B) Discounted Payback Period

Discounted Payback Period is calculated after discounting the cash flows by a pre-determined rate (cut— off rate), it is called as the 'Discounted Payback Period'. It is computed as under –

Procedure for computation of Discounted Payback Period

Step 1: Determine the Total Cash Outflow of the project. (Initial Investment)

Step 2: Determine the Cash Inflow after Taxes (CFAT) for each year.

Step 3:

- Determine the PV factor for each year and compute Discounted CFAT (DCFAT)
- $DCFAT = CFAT \text{ of each year} \times PV \text{ Factor for that year for each year.}$

Step 4: Determine the cumulative DCFAT at the end of every year.

Step 5: Determine the year in which cumulative DCFAT exceeds Initial Investment.

Step 6:

- Compute Discounted Payback Period as the time at which cumulative DCFAT = Initial Investment.
- This is calculated on "time proportion basis".

Step 7:

- Accept if Discounted Payback Period less than maximum / benchmark period, else reject the project.

(C) Payback Reciprocal

It is the reciprocal of Payback Period. It is expressed in percentage and computed as under -
Average Annual Cash Inflows (i. e. CFAT p.a.)

$$\text{Payback Reciprocal} = \frac{\text{Average Annual Cash Inflow (i.e. CFAT p.a)}}{\text{Initial Investment}}$$

The Payback Reciprocal is considered to be an approximation of the Internal Rate of Return, if-

- (a) The life of the project is at least twice the payback period and
- (b) The project generates equal amount of the annual cash inflows.

Example:

A project with an initial investment of ₹ 50 Lakhs and life of 10 years, generates CFAT of ₹10 Lakhs per annum. Its Payback Reciprocal will be ₹10 Lakhs ÷ ₹ 50 Lakhs = 20%.

(D) Accounting or Average rate of Return Method (ARR),

Accounting or Average Rate of Return means the average annual yield on the project. In this method, Profit After Taxes (instead of CFAT) is used for evaluation.

Procedure for computation of ARR:

Step 1:

- Determine Net Investment of the project.
- Net Investment = Initial Investment less Salvage Value.

Step 2:

- Determine the Profits After Tax (PAT) for each year.
- PAT = CFAT Less Depreciation.

Step 3:

- Determine the Total PAT for N years,
- where N = Project Life.

Step 4: Compute Average PAT per annum = Total PAT of all years / N years.

Step 5: ARR = Average PAT per annum / Net Investment = Step 4 / Step 1.

Advantages

- (i) Simple to understand.
- (ii) Easy to operate and compute.
- (iii) Income throughout the project life is considered.



Limitations

- (i) It does not consider cash inflows (CFAT), which is important in project evaluation rather than PAT.
- (ii) It takes the rough average of profits of future years. The pattern or fluctuations in profits are ignored.
- (iii) It ignores time value of money, which is important in capital budgeting decisions.

(E) Net Present Value Method (NPV) or Discounted Cash Flow Technique (DCF)

The Net Present Value of an investment proposal is defined as the sum of the Present Values of all future Cash Inflows less the sum of the Present Values of all Cash Outflows associated with the proposal. Thus, NPV is calculated as under -

NPV = Discounted Cash Inflows Less Discounted Cash Outflows.

$$\text{NPV} = \frac{\text{FV}_1}{(1+K)^1} + \frac{\text{FV}_2}{(1+K)^2} + \frac{\text{FV}_3}{(1+K)^3} + \frac{\text{FV}_4}{(1+K)^4} + \dots + \frac{\text{FV}_n}{(1+K)^n} \text{ Less Initial Inv } t_0$$

Note: K = Cut-Off Rate, FV = Future Cash Inflows arising at points of time 1,2,3,4, ... n.

Initial Investment pertains to Time 0 and is hence not discounted.

Procedure for computation of NPV:

Step 1: Determine the Total Cash Outflow of the project and the time periods in which they occur.

Step 2: Compute the Total Discounted Cash Outflow = Outflow x PV factor.

Step 3: Determine the Total Cash Inflows of the project and the time periods in which they arise.

Step 4: Compute the Total Discounted Cash Inflows = Inflow X PV factor.

Step 5: Compute NPV = Discounted Cash Inflows Less Discounted Cash Outflows (Step 4 Less Step 2).

Step 6: Accept Project if NPV is positive, else reject.

Decision Making or Acceptance Rule:

NPV > 0 Accept the Project. Surplus over and above the cut-off rate is obtained.

NPV = 0 Project generates cash flows at a rate just equal to the Cost of Capital. Hence, it may be accepted or rejected. This constitutes an Indifference Point.

NPV < 0 Reject the Project. The Project does not provide returns even equivalent to the cut-off rate.

Cash Outflows: Generally, Cash Outflows consist of- (a) Initial investment which occurs at Time "0" and (b) Special Payments and outflows, e.g. Working Capital outflow which arises in the year of commercial production, Tax paid on Capital Gain made by sale of old asset, if any.

Cash Inflows: Cash Inflows = CFAT. Also, specific Cash Inflows like salvage value of new assets and recovery of working capital at the end of the project, tax savings on loss due to sale of old asset, should be carefully considered. The general assumption is that all cash inflows occur at the end of each year.

Discounting Cash Inflows and Outflows: Each item of cash inflow and outflow is discounted to ascertain its present value. For this purpose, the discounting rate is generally taken as the Cost of Capital since the project must earn atleast what is paid out on the funds blocked in the. project. The Present Value tables are used to calculate the present value of various cash flows. In case of Uniform Cash Inflows p.a, Annuity Tables may be used.

Use of Discounting Rate: Instead of using the PV factor tables, the relevant discount factor can be computed as $1 / (1 + k)^n$, where k = cost of capital and n — year in which the inflow or outflow takes place.

Hence, PV factor at 10% after one year = $1 / (1.10)^1 = 0.9091$

Similarly, PV factor at the end of two years = $1 / (1.10)^2 = 0.8264$ and so on.

Note: The NPV method will give valid results only if money can be immediately reinvested at a rate of return equal to the Firm's Cost of Capital.

Advantages

- (i) It considers the time value of money. Hence it satisfies the basic criterion for project evaluation.
- (ii) Unlike payback period, all cash flows (including post-payback returns) are considered.
- (iii) NPV constitutes addition to the wealth of Shareholders and thus focuses on the basic objective of financial management.
- (iv) Since all cash flows are converted into present value (current rupees), different projects can be compared on NPV basis. Thus, each project can be evaluated independent of others on its own merit.

Limitations

- (i) It involves complex calculations in discounting and present value computations.
- (ii) It involves forecasting cash flows and application of discount rate. Thus accuracy of NPV depends on accurate estimation of these two factors which may be quite difficult in practice.
- (iii) NPV and project ranking may differ at different discount rates, causing inconsistency in decision-making.
- (iv) It ignores the difference in initial outflows, size of different proposals etc, while evaluating mutually exclusive projects.

(F) Profitability Index (PI) or Desirability Factor or Benefit Cost Ratio

Profitability Index (PI)

Benefit-Cost Ratio / Profitability Index or Desirability Factor is the ratio of present value of operating cash inflows to the present value of net investment cost.

$$\text{PI [or] Desirability Factor [or] Benefit Cost Ratio} = \frac{\text{Present Value of Operational Cash Inflows}}{\text{Present Value of Net Investment}}$$

Significance: Profitability Index represents amount obtained at the end of the project life, for every rupee invested in the project. The higher the PI, the better it is, since the greater is the return for every rupee of investment in the project.

Decision Making or Acceptance Rule:

$\text{PI} > 1$ Accept the Project. Surplus over and above the cut-off rate is obtained.

$\text{PI} = 1$ Project generates cash flows at a rate just equal to the Cost of Capital. Hence, it may be accepted or rejected. This constitutes an Indifference Point.

$\text{PI} < 1$ Reject the Project. The Project does not provide returns even equivalent to the cut-off rate.

Note: When $\text{NPV} > 0$, PI will always be greater than 1. Both NPV and PI use the same factors i.e. Discounted Cash Inflows (A) and Discounted Cash Outflows (B), in the computation. $\text{NPV} = A - B$, whereas $\text{PI} = A / B$.

Advantages:

- (i) This method considers the time value of money.
- (ii) It is a better project evaluation technique than Net Present Value and helps in ranking projects where Net Present Value is positive.



- (iii) It focuses on maximum return per rupee of investment and hence is useful in case of investment in divisible projects, when availability of funds is restricted.

Disadvantages:

- (i) In case a single large project with high Profitability Index is selected, possibility of accepting several small projects which together may have higher NPV than the single project is excluded.
- (ii) Situations may arise where a project with a lower profitability index selected may generate cash flows in such a way that another project can be taken up one or two years later, the total NPV in such case being more than the one with a project with highest Profitability Index.
- (iii) In case of more than one proposals, which are mutually exclusive, with different investment patterns or values, profitability index alone cannot be used as a measure for choosing.

(G) Internal Rate of Return (IRR) and Modified Internal Rate of Returns (MIRR)

Internal Rate of Return (IRR)

Internal Rate of Return (IRR) is the rate at which the sum total of Discounted Cash Inflows equals the Discounted Cash Outflows. The Internal Rate of Return of a project is the discount rate which makes Net Present Value of the project equal to zero.

IRR refers to that discount rate K , such that

$$\frac{FV_1}{(1+K)^1} + \frac{FV_2}{(1+K)^2} + \frac{FV_3}{(1+K)^3} + \frac{FV_4}{(1+K)^4} + \dots + \frac{FV_n}{(1+K)^n} \text{ Less Initial Inv}t_0 = 0 \text{ (Zero)}$$

At IRR, NPV = 0 and PI = 1.

The discount rate, i.e. cost of capital is assumed to be known in the determination of Net Present Value, while in the IRR calculation, the Net Present Value is set equal to zero and the discount rate which satisfies this condition is determined.

Internal Rate of Return can be interpreted in two ways -

- (a) IRR represents the rate of return on the unrecovered investment balance in the project.
- (b) IRR is the rate of return earned on the initial investment made in the project.

Of these, the first view seems to be more realistic, since it may not always be possible for an enterprise to reinvest intermediate cash flows at a rate equal to the IRR.

Decision Making or Acceptance Rule

$IRR > K_o$ Accept the Project. Surplus over and above the cut-off rate is obtained.

$IRR = K_o$ Project generates cash flows at a rate just equal to the Cost of Capital. Hence, it may be accepted or rejected. This constitutes an Indifference Point.

$IRR < K_o$ Reject the Project. The Project does not provide returns even equivalent to the cut-off rate.

Procedure for computation of IRR:

Step 1: Determine the total cash outflow of the project and the time periods in which they occur.

Step 2: Determine the total cash inflows of the project and the time periods in which they arise.

Step 3: Compute the NPV at an arbitrary discount rate, say 10%

Step 4: Choose another discount rate and compute NPV. The Second Discount Rate is chosen in such a way that one of the NPVs is negative and the other is positive. Suppose, NPV is positive at 10%, choose a higher discount rate so as to get a negative NPV. In case NPV is negative at 10%, choose a lower rate.

Step 5: Compute the change in NPV over the two selected discount rates.

Step 6: On proportionate basis, compute the discount rate at which NPV is Zero.

Advantages

- (i) Time value of money is taken into account.
- (ii) All cash inflows of the project, arising at different points of time are considered.
- (iii) Decisions are immediately taken by comparing IRR with the cost of capital.
- (iv) It helps in achieving the basic objective of maximisation of shareholders wealth. All projects having IRR above the Cost of Capital will be automatically accepted.

Disadvantages

- (i) IRR is only an approximation and cannot be computed exactly always.
- (ii) It is tedious to compute in case of multiple cash outflows. Multiple IRR's may result, leading to difficulty in interpretation.
- (iii) It may conflict with NPV in case inflow/ outflow patterns are different in alternative proposals.
- (iv) The presumption that all the future cash inflows of a proposal are reinvested at a rate equal to the IRR may not be practically valid.

Modified Internal Rate of Return (MIRR).

Modified Internal Rate of Return is computed as under -

Step 1: Determine the total Cash Outflows & Inflows of the project and the time periods in which they occur.

Step 2: Compute Terminal Value of all Cash Flows other than the Initial Investment. For this purpose, Terminal Value of a Cash Flow = Amount of Cash Flow X Re-investment Factor, where

Reinvestment Factor = $(1+K)^n$ where n = number of years balance remaining in the project.

Step 3: Compute Total of Terminal Values as computed under Step 2. This is taken as the "Inflow" from the project, to be compared with the "Outflow" i.e. the initial investment.

Step 4: Compute MIRR, i.e. Discount Rate such that PV of Terminal Value = Initial Investment.

Note: For computing MIRR, the interpolation techniques applicable to IRR may be used.

10.1.7 Difference in Project Life under EAC and LCM Approaches

Comparison between two projects can be done based on NPV method only if initial investment and project lives are the same. "Where project lives are different, the decisions can be obtained by any of the following methods, which are variants of the NPV method —

(i) Equivalent Annual Flows Method

- (a) Cash flows are converted into an equivalent annual annuity called EAB i.e. Equivalent Annual Benefit (in case of net inflow) or EAC i.e. Equivalent Annual Cost (in case of net outflow) i.e. $\text{Total Discounted Cash Flows} \div \text{Total Discount Factor for the Period}$
- (b) The amounts are then compared and decisions drawn i.e. in case of cost comparison, proposal with the lower Equivalent Annual Flow will be selected, and in case of benefit comparison, proposal with the higher Annual Flow will be selected.

(ii) LCM Method

- (a) Evaluate the alternatives over an interval equal to the lowest common multiple of the lives of the alternatives under consideration.



(b) Example, Proposal A has 3 Years and Proposal B has 5 years. Lowest common multiple period = 15 years, during which period Machine A will be replaced 5 times and Machine B will be replaced 3 times). Cash Flows are extended to this period and computations made. The final results would then be on equal platform i.e. equal years, and hence would be comparable.

(c) This is similar to the Equivalent Annual Benefits / Cost Method, discussed above.

(iii) Terminal Value

Estimate the terminal value for the alternatives at the end of a certain period i.e. product life. In the above example, if the product can be produced only for 3 Years, the salvage value at the end of the 3rd year should be considered in the evaluation process.

Equivalent Annual Flows Method used in project-life disparity situations

Step 1: Compute the Initial Investment of each alternative.

Step 2: Determine the project lives of each alternative.

Step 3: Determine the Annuity Factor relating to the project life of each alternative.

Step 4: Compute Equivalent Annual Investment (EAI) = Initial Investment / Relevant Annuity Factor

Step 5: Compute CFAT per annum or Cash Outflows per annum, of each alternative.

Step 6:

- Compute Equivalent Annual Benefit (EAB) = CFAT per annum Less EAI **or,**
- Compute Equivalent Annual Costs (EAC) = Cash Outflows per annum + EAI

Step 7: Select Project with Maximum EAB or Minimum EAC, as the case may be.

Capital Rationing

There may be situations where a Firm has a number of projects that yield a positive NPV. However, the most important resource in investment decisions, i.e. funds, are not fully available to undertake all the projects. In such case, the objective of the firm is to maximize the wealth of shareholders with the available funds. Such investment planning is called Capital Rationing.

There are two possible situations of Capital Rationing:-

- (i) Generally, Firms fix up maximum amount that can be invested in capital projects, during a given period of time, say a year. This budget ceiling imposed internally is called as Soft Capital Rationing.
- (ii) There may be a market constraint on the amount of funds available for investment during a period. This inability to obtain funds from the market, due to external factors is called Hard Capital Rationing.

Objective- NPV Maximisation

Whenever Capital Rationing exists, the Firm should allocated the limited funds available in such a way that maximizes the NPV of the Firm. The following principles may be applied in selecting the appropriate investment proposals / combinations -

Nature of Project Indivisible

Meaning

Investment should be made in full. Partial or Proportionate investment is not possible.

Divisible

Partial Investment is possible and proportionate NPV can be obtained.

Steps involved in Decision-making	• Determine the combination of projects to utilise amount available. • Compute NPV of each combination. • Select combination with maximum NPV	• Compute PI of various projects and rank them based on PI. • Projects are selected based on maximum Profitability Index.

Other Factors considered for Capital rationing situation:

In the above procedure, it is assumed that the investment funds are restricted for one period only, i.e. if investment is not made immediately, the project will lapse. However, in the following situations, additional mathematical techniques are adopted to resolve the Capital Rationing problems:

- (i) Cost of investment projects spread over several periods,
- (ii) Projects providing relatively higher cash flows in earlier years, which can be used for increasing the fund availability for other projects in those early years.

Profitability Index (PI) and Net Present Value (NPV) – Similarities and Dissimilarity in an investment proposals situation

(a) Acceptance - Rejection Decision

- ❖ Both NPV & PI techniques recognise the time value of money.
- ❖ The discount rate used in NPV and PI methods are the same.
- ❖ Both NPV and PI use the same factors i.e. Discounted Cash Inflows (A) and Discounted Cash Outflows (B), in the computation. $NPV = A - B$, whereas $PI = A / B$.
- ❖ When $NPV > 0$, PI will always be greater than 1. Also when $NPV < 0$, PI will be less than 1.

Hence, for a given project, NPV and PI method give the same Accept or Reject decision.

- (b) Ranking Criteria: However, if one project is to be selected out of two mutually exclusive projects, the NPV and PI method may give conflicting ranking criteria. An example is given below -

Project	X	Y
Discounted Cash Inflows	₹ 10 Lakhs	₹ 5 Lakhs
Less: Discounted Cash Outflows	₹ 5 Lakhs	₹ 2 Lakhs
Net Present Value	₹ 5 Lakhs	₹ 3 Lakhs
Profitability Index	2.00	2.50

Project 'X' has a better ranking based on NPV while Project 'Y' will be preferred if PI were to be used for decision-making. Thus, there is a conflict in ranking, between NPV and PI methods. This is because NPV gives the ranking in terms of absolute value of rupees, whereas PI gives ranking for every rupee of investment, i.e. in terms of ratio.

- (c) Decision-making: Generally the NPV method should be preferred since NPV indicates the economic contribution or surplus of the project in absolute terms. However, in capital rationing situations, for deciding between mutually exclusive projects, PI is a better evaluation technique.

Difference between NPV and IRR

- (a) Causes for Conflict: Higher the NPV, higher will be the IRR. However, NPV and IRR may give conflicting results in the evaluation of different projects, in the following situations -

- (i) Initial Investment Disparity - i.e. Different Project Sizes,
- (ii) Project Life Disparity - i.e. Difference in Project Lives,



- (iii) Outflow Patterns - i.e. when Cash Outflows arise at different points of time during the Project Life, rather than as Initial Investment (Time 0) only.
- (iv) Cash Flow Disparity - when there is a huge difference between initial CFAT and later years' CFAT. A project with heavy initial CFAT than compared to later years will have higher IRR and vice-versa.
- (b) Superiority of NPV: In case of conflicting decisions based on NPV and IRR, the NPV method must prevail. Decisions are based on NPV, due to the comparative superiority of NPV, as given from the following points -
 - (i) NPV represents the surplus from the project but IRR represents the point of no surplus-no deficit.
 - (ii) NPV considers Cost of Capital as constant. Under IRR, the Discount Rate is determined by reverse working, by setting NPV = 0.
 - (iii) NPV aids decision-making by itself i.e. projects with positive NPV are accepted. IRR by itself does not aid decision-making. For example, a project with IRR = 18% will be accepted if $K_0 < 18\%$. However, the project will be rejected if $K_0 = 21\%$ (say $> 18\%$).
 - (iv) NPV method considers the timing differences in Cash Flows at the appropriate discount rate. IRR is greatly affected by the volatility / variance in Cash Flow patterns.
 - (v) IRR presumes that intermediate cash inflows will be reinvested at that rate (IRR), whereas in the case of NPV method, intermediate cash inflows are presumed to be reinvested at the cut-off rate. The latter presumption viz. Reinvestment at the Cut-Off Rate, is more realistic than reinvestment at IRR.
 - (vi) There may be projects with negative IRR/ Multiple IRR etc. if cash outflows arise at different points of time. This leads to difficulty in interpretation. NPV does not pose such interpretation problems.

10.1.8 Social Cost-Benefit Analysis, Break-Even Analysis

Social Cost-Benefit Analysis

In evaluation of investment proposals, the return on investment factor is considered dominant. However, since scarce resources are employed, the social impact of investment proposals should also be considered. Such analysis is called Social Cost Benefit Analysis (SCBA).

The purpose of SCBA to supplement and strengthen the existing techniques of financial analysis.

Need for Social Cost Benefit Analysis (SCBA)

- (i) Market prices used to measure costs and benefits in project analysis, do not represent social values due to imperfections in market.
- (ii) Monetary Cost Benefit Analysis fails to consider the external effects of a project, which may be positive like development of infrastructure or negative like pollution and imbalance in environment.
- (iii) Taxes and subsidies are monetary costs and gains, but these are only transfer payments from social point of view and therefore irrelevant.
- (iv) SCBA is essential for measuring the redistribution effect of benefits of a project as benefits going to poorer section are more important than one going to sections which are economically better off.
- (v) Projects manufacturing life necessities like medicines, or creating infrastructure like electricity generation are more important than projects for manufacture of liquor and cigarettes. Thus merit wants are important appraisal criterion for SCBA.

Procedure: Social Cost Benefit Analysis Involves the following Steps:

Step 1 Determine the problem to be considered.

Step 2 Ascertain alternative solutions / projects to the problem.

Step 3 Estimate and analyse the social costs and benefits.

Step 4 Appraise the estimated social costs and benefits.

Step 5 Decide on the optimal solution.

Relevance of Social Cost Benefit Analysis for Private Enterprises

- (i) Social cost benefit analysis is important for private corporations also which have a moral responsibility to undertake socially desirable projects.
- (ii) If the private sector includes social cost benefit analysis in its project evaluation techniques, it will ensure that it is not ignoring its own long-term interest, since in the long run only projects that are socially beneficial and acceptable, will survive.
- (iii) Methodology of social cost benefit analysis can be adopted either from the guidelines issued by the United Nations Industrial Development Organisation (UNIDO) or the Organisation of Economic Cooperation and Development (OECD). Financial Institutions e.g. IDBI, IFCI, etc. even insist on social cost benefit analysis of a private sector project before sanctioning any loan.
- (iv) Private enterprise cannot afford to lose sight of social aspects of a project.

Break-even Analysis

Break-even analysis is carried out to establish the lowest production and/or sales levels at which a project can operate without endangering its financial viability. The term break-even point (BEP) is used to indicate a level of operation at which a project yields neither profit nor loss. This level can be expressed either as a percentage of capacity utilization in physical units or as a volume of sales revenue. The break-even point could also be expressed as a minimum selling price for outputs or as the maximum purchasing price for inputs as well as the maximum operating cost per unit of output.

The lower the break-even point, the higher the chances of a project are for earning profits and the lower the risk of making losses. The difference between the expected use of the installed capacity and the BEP is a safety margin. The larger this margin is, the better. The BEP expresses the lowest tolerable level of utilization of the production capacity.

Break-even analysis may be particularly useful in a situation in which a decision is very sensitive to a certain variable. If the break-even point for that variable (level of capacity utilization, volume of sales) can be calculated, it may be possible to estimate on which side of the break-even point the operations may fall, even though there may be considerable uncertainty regarding the exact value of the variable. Even in this case, however, it is desirable to investigate the range of values of the variable which would permit that alternative to be attractive and to estimate the consequences of its occurring outside that range.

The magnitude of the break-even point depends on three basic aggregated variables investment, output and operating costs. Each comprises quantity and a price. Other factors, such as product-mix, input-mix and type of technology, may also affect the break-even point directly or indirectly.

Operating costs can be broken down conditionally into two main groups fixed costs and variable costs. Fixed costs are independent of actual production, they usually remain constant regardless of the volume of production, or they increase, but much more slowly than production volume (depreciation, administrative expenses etc). Variable costs are directly related to the level of output. They increase or decrease with the increase or decrease of the level of production (raw materials, power, fuel, direct labour inputs etc).

The period adopted for the break-even analysis should be clearly specified. It is recommended to work with data from a normal year.



The algebra of break-even analysis

Let Q_{BE} denote the break-even output level. By definition

$$TR \text{ (at } Q_{BE}) = TC \text{ (at } Q_{BE})$$

$$\text{Or } TR \text{ (at } Q_{BE}) = TFC + TVC \text{ (at } Q_{BE}) \quad (1)$$

The break-even condition, (1) holds true for any cost and demand functions. Hence, in general, when costs and demand are complex, the analysis of this condition might not be any simpler than the analysis of profit maximization. Yet, what is widely known in business as break-even analysis is indeed much easier than profit analysis, although it also starts with the above identity, because it makes a very important assumption: that price and average variable cost do not change with output level.

Thus, if we assume that price and AVC are constant, (1) can be rewritten as follows

$$P \cdot Q_{BE} = TFC + AVC \cdot Q_{BE}$$

which yields:

$$Q_{BE} = \frac{TFC}{P - AVC} \quad (2)$$

The difference " $P - AVC$ " is often called the average contribution margin (ACM) because it represents the portion of selling price that "contributes" to paying the fixed costs.

Formula (2) can be generalized to deal with the situation where the firm has determined in advance a target profit. The output quantity Q^* that will yield this profit is implicitly given by

$$P \cdot Q^* = \text{Target profit} + TFC + AVC \cdot Q^*$$

hence

$$Q_{BE} = \frac{TFC + \text{Target Profit}}{P - AVC}$$

Example: Calculate the break-even output for $TFC = ₹ 20,000$, $P = ₹ 7$, and $AVC = ₹ 5$

Solution:

$$Q_{BE} = \frac{20,000}{7 - 5} = \frac{20,000}{2} = 10,000$$

Example: Suppose $TFC = ₹ 10,000$, $P = ₹ 5$, $AVC = ₹ 2$. What is the output necessary to earn ₹ 5000 total profit? What is the "average contribution margin"?

Solution:

$$Q_{BE} = \frac{10,000 + 5000}{5 - 2} = \frac{15,000}{3} = 5,000$$

$$ACM = P - AVC = ₹ 3$$

10.1.9 Impacts of Inflation on Capital Budgeting

Overview of Inflation

Everyone is familiar with the term 'Inflation' as rising prices. This means the same thing as fall in the value of money. For example, a person would like to buy 5kgs of apple with ₹ 100, at the present rate of inflation, say, zero. Now when the inflation rate is 5%, then the person would require Rs. 105 to buy the same quantity of apples. This is because there is more money chasing the same produce. Thus, Inflation is a monetary ailment in an economy and it has been defined in so many ways, which can be defined as "the change in purchasing power in a currency from period to period relative to some basket of goods and services".

When analyzing Capital Budgeting Decisions with inflation, it is required to distinguish between expected and unexpected inflation. The difference between unexpected and expected inflation is of crucial importance as the effects of inflation, especially its redistributive effect, depend on whether it is expected or not. Expected inflation refers to the loss the manager anticipates in buying power over time whereas unexpected inflation refers to the difference between actual and expected inflation. If rate of inflation is expected, then the manager take steps to make suitable adjustments in their proposals to avoid the adverse effects which could bring to them.

Measuring Inflation: Inflation is measured by observing the change in the price of a large number of goods and services in an economy, usually based on data collected by government agencies. The prices of goods and services are combined to give a price index or average price level, the average price of the basket of products. The inflation rate is the rate of increase in this index; while the price level might be seen as measuring the size of a balloon, inflation refers to the increase in its size. There is no single true measure of inflation, because the value of inflation will depend on the weight given to each good in the index.

The common measures of inflation include: Consumer price indexes (CPIs), Producer price indexes (PPIs), Wholesale price indexes (WPIs), commodity price indexes, GDP deflator, and Employment cost index. Table showing the rate of inflation in India (2005- 2012) based on WPI, based on CPI and growth rate in GDP is given table 1.

Table1. Rate of Inflation in India (2005- 2012)

Year	Based on WPI (%)	Based on CPI (%)	Growth rate in GDP (%)
January 2012		5.32	-
2011-12	10.5	8.87	8.2
2010-11	13.7	12.11	8.5
2009-10	7.3	10.83	8.0
2008-09	8.4	8.32	6.8
2007-08	4.7	6.39	9.3
2006-07	5.4	5.79	9.6
2005-06	4.4	4.25	9.5
2004-05	6.5	3.77	8.3

Inflation and Gross Domestic Product (GDP): Inflation and GDP growth are probably the two most important macroeconomic variables. The Gross Domestic Product (GDP) is the key indicator used to measure the health of a country's economy. The GDP of a country is defined as the market value of all final goods and services produced within a country in a given period of time. Usually, GDP is expressed as a comparison to the previous quarter or year. For example, if the year-to-year GDP was up by 3%, it means that the economy has grown by 3% over the last year.

A significant change in GDP, whether increase or decrease, usually reflects on the stock market. The reason behind this is that, a bad economy usually means lower profits for companies, which in turn means lower stock prices. Investors really worry about negative GDP growth. Therefore growth in GDP reflects both on growth in the economy and price changes (inflation). GDP deflator is based on calculations of the GDP: it is based on the ratio of the total amount of money spent on GDP (nominal GDP) to the inflation corrected measure of GDP (constant price or real GDP). It is the broadest measure of the price level.

Deflators are calculated by using the following formula:

$$\frac{\text{Nominal GDP}}{\text{Real GDP}} \text{ GDP Deflator} = \frac{\text{Nominal GDP}}{\text{Real GDP}} \times 100$$



Current price figures measure value of transactions in the prices relating to the period being measured. On the other hand, Constant price figures express value using the average prices of a selected year, this year is known as the base year. Constant price series can be used to show how the quantity or volume of goods has changed, and are often referred to as volume measures. The ratio of the current and constant price series is therefore a measure of price movements, and this forms the basis for the GDP deflator. The GDP deflator shows how much a change in the base year's GDP relies upon changes in the price level. It is also known as the "GDP implicit price deflator".

Because it isn't based on a fixed basket of goods and services, the GDP deflator has an advantage over the Consumer Price Index. Changes in consumption patterns or the introduction of new goods and services are automatically reflected in the deflator.

Inflation and Capital Budgeting Decisions

Capital budgeting results would be unrealistic if the effects of inflation are not correctly factored in the analysis. For evaluating the capital budgeting decisions; we require information about cash flows-inflows as well as outflows. In the capital budgeting procedure, estimating the cash flows is the first step which requires the estimation of cost and benefits of different proposals being considered for decision-making. The estimation of cost and benefits may be made on the basis of input data being provided by experts in production, marketing, accounting or any other department. Mostly accounting information is the basis for estimating cash flows. The Managerial Accountant's task is to design the organization's information system or Management Accounting System (MAS) in order to facilitate managerial decision making. MAS parameters have to be designed on the basis for commonalities in the decision process of executives involved in strategic capital budgeting decisions.

This has been emphasized by David F Larcker and examined whether executives have similar preferences regarding information which may be used in making strategic capital budgeting decisions. The results indicate that executives have similar informational preferences, the preferred information characteristics depend upon the stage of the decision, and environmental and organizational structure variables are not associated with an executive's informational preferences.

Inflation and Cash Flows: As mentioned above, estimating the cash flows is the first step which requires the estimation of cost and benefits of different proposals being considered for decision-making. Usually, two alternatives are suggested for measuring the 'Cost and benefits of a proposal i.e., the accounting profits and the cash flows.

In reality, estimating the cash flows is most important as well as difficult task. It is because of uncertainty and accounting ambiguity.

Accounting profit is the resultant figure on the basis of several accounting concepts and policies. Adequate care should be taken while adjusting the accounting data, otherwise errors would arise in estimating cash flows. The term cash flow is used to describe the cash oriented measures of return, generated by a proposal. Though it may not be possible to obtain exact cash-effect measurement, it is possible to generate useful approximations based on available accounting data. The costs are denoted as cash outflows whereas the benefits are denoted as cash inflows. The relation between cash flows and Accounting Profit is discussed in the subsequent Para, before a detailed discussion on effect of Inflation and cash flows is done.

Cash Flows Vs Accounting Profit: The evaluation of any capital investment proposal is based on the future benefits accruing for the investment proposal. For this, two alternative criteria are available to quantify the benefits namely, Accounting Profit and Cash flows. This basic difference between them is primarily due to the inclusion of certain non-cash items like depreciation. This can be illustrated in the Table 2:

Table2. A Comparison of Cash Flow and Accounting Profit Approaches

Accounting Approach			Cash flow Approach		
Particulars	₹	₹	Particulars	₹	₹
Revenue		1,000	Revenue		1,000
Less: Expenses			Less: Expenses		
Cash Expenses	400		Cash Expenses	400	
Depreciation	200	600	Depreciation	200	600
Earnings before Tax		400	Earnings before Tax		400
Tax @ 50%		200	Tax		200
Earnings after Tax		200	Earnings after Tax		200
			Add: Depreciation		200
			Cash flow		400

Effects of Inflation on Cash Flows: Often there is a tendency to assume erroneously that, when, both net revenues and the project cost rise proportionately, the inflation would not have much impact. These lines of arguments seem to be convincing, and it is correct for two reasons. First, the rate used for discounting cash flows is generally expressed in nominal terms. It would be inappropriate and inconsistent to use a nominal rate to discount cash flows which are not adjusted for the impact of inflation. Second, selling prices and costs show different degrees of responsiveness to inflation. Estimating the cash flows is a constant challenge to all levels of financial managers. To examine the effects of inflation on cash flows, it is important to note the difference between nominal cash flow and real cash flow. It is the change in the general price level that creates crucial difference between the two.

A nominal cash flow means the income received in terms rupees. On the other hand, a real cash flow means purchasing power of your income. The manager invested Rs.10000 in anticipation of 10 per cent rate of return at the end of the year. It means that the manager will get Rs.11000 after a year irrespective of changes in purchasing power of money towards goods or services. The sum of Rs.11000 is known as nominal terms, which includes the impact of inflation. Thus, Rs. 1000 is a nominal return on investment of the manager. On the other hand, (Let us assume the inflation rate is 5 per cent in next year. Rs.11000 next year and Rs.10476.19 today are equivalent in terms of the purchasing power if the rate of inflation is 5 per cent.) Rs.476.19 is in real terms as it adjusted for the effect of inflation. Though the manager's nominal rate of return is Rs. 1000, but only Rs. 476 is real return. The same has been discussed with capital budgeting problem.

ABC Ltd is considering a new project for manufacturing of toys involving a capital outlay of Rs.6 Lakhs. The capacity of the plant is for an annual production capacity 60000 toys and the capacity utilization is during the 3 years working life of the project is indicated below:

Year	1	2	3
Capacity Utilization	60	75	100

The selling price per toy is Rs.10 and contribution is 40 per cent. The annual fixed costs, excluding depreciation are to be estimated Rs.28000 per annum. The depreciation is 20 per cent and straight line method. Let us assume that in our example the rate of inflation is expected to be 5 per cent.

Table 3: A Comparison of Real Cash Flow and Nominal Cash Flow

(Figures in ₹)

Particulars/ Year	1	2	3
Sales Revenue	360000	450000	600000



Less: Variable Cost	216000	270000	360000
Depreciation	120000	120000	120000
Fixed Cost	28000	28000	28000
Earnings before Tax	(4000)	32000	100000
Tax @ 50%	-	16000	50000
Profit after tax	-	16000	50000
Real Cash flow	116000	136000	170000
Inflation Adjustment	(1.05) ¹	(1.05) ²	(1.05) ³
Nominal Cash flow	121800	149940	196796

Therefore, the finance manager should be consistent in treating inflation as the discount rate is market determined. In addition to this, a company's output price should be more than the expected inflation rate. Otherwise there is every possibility is to forego the good investment proposal, because of low profitability. And also, future is always unexpected, what will be the real inflation rate (may be more or less). Thus, in estimating cash flows, along with output price, expected inflation must be taken into account. In dealing with expected inflation in capital budgeting analysis, the finance manager has to be very careful for correct analysis. A mismatch can cause significant errors in decision making. Therefore the finance manager should always remember to match the cash flows and discount rate as mentioned below table 4.

Table 4. Match Up Cash Flows and Discount Rate

Cash flows	Discount rate	Yields
Nominal Cash flow	Nominal discount rate	Present Value
Real cash flow	Real discount rate	Present Value

Inflation and Discount Rate: The discount rate has become one of the central concepts of finance. Some of its manifestations include familiar concepts such as opportunity cost, capital cost, borrowing rate, lending rate and the rate of return on stocks or bonds. It is greatly influenced in computing NPV. The selection of proper rate is critical which helps for making correct decision. In order to compute net present value, it is necessary to discount future benefits and costs. This discounting reflects the time value of money. Benefits and costs are worth more if they are experienced sooner. The higher the discount rate, the lower is the present value of future cash flows.

For typical investments, with costs concentrated in early periods and benefits following in later periods, raising the discount rate tends to reduce the net present value.

Thus, discount rate means the minimum requisite rate of return on funds committed to the project. The primary purpose of measuring the cost of capital is its use as a financial standard for evaluating investment projects.

Effects of Inflation on Discount Rate: Using of proper discount rate, depends on whether the benefits and costs are measured in real or nominal terms. To be consistent and free from inflation bias, the cash flows should match with discount rate. Considering the above example, 10 per cent is a nominal rate of return on investment of the manager. On the other hand, (Let us assume the inflation rate is 5 per cent, in next year), though the manager's nominal rate of return is 10 per cent, but only 4.76 percent is real rate of return. In order to receive 10 per cent real rate of return, in view of 5 per cent expected inflation rate, the nominal required rate of return would be 15.5%. The nominal discount rate (r) is a combination of real rate (K), expected inflation rate (a). This relationship is known as Fisher's effect, which may be stated as follows:

$$r = (1-K) (1- a) -1$$

The relationship between the rate of return and inflation in the real world is a tough task to explain than the theoretical relationship described above. Experience shows that deflation of any series of interest rates over time by any popular price index does not yield relatively constant real rates of interest. However, this should not be interpreted as the current rate of interest is properly adjusted for the actual rate of inflation, but only that it will contain some expected rate of inflation. Furthermore, the ability of accurately forecasting the rate of inflation is very rare.

Inflation in various aspects of financial management are as follows :-

(a) Financing Decisions

- (i) This involves identifying the source from which the Finance Manager should raise the quantum of funds required by a company.
- (ii) Debenture holder and Preference Shareholders are interested in fixed income while Equity Shareholders are interested in higher profits to earn high dividend. The Finance Manager is required to estimate the amount of profits he is going to earn in future.
- (iii) While estimating the revenue and costs, he must take into consideration the inflation factor, since under inflationary conditions, expectations of Equity Shareholders will rise.

(b) Investment Decision

- (i) Investment Decisions will be biased, if the impact of inflation is not correctly factored in the analysis. This is because cash flows of an investment project occur over a long period of time.
- (ii) Non-consideration or inappropriate consideration will give rise to wrong profitability values, and will result in incorrect decisions.

(c) Working Capital Decisions

- (i) Impact of inflation should be considered while estimating the requirements of working capital. Due to the increasing input prices and manufacturing costs, more funds will be blocked in inventories and receivables.
- (ii) Even though working capital management is over a shorter period, inflation rate may vary wildly even in short periods of time.

(d) Dividend Payout Policy

- (i) While taking Dividend decisions, the Finance Manager has to consider the inflation factor, and ensure that the capital of the Company remains intact, even after the payment of dividend.
- (ii) In an inflationary situation, the depreciation provided on the basis of historical costs of assets would not provide adequate funds for replacement of Fixed Assets at the expiry of their useful lives.
- (iii) Therefore, more profits may have to be retained than what has been retained by way of depreciation. This is more relevant in case of those industries, where technological changes will render the existing infrastructure redundant at a rapid pace.

10.1.10 Sensitivity Analysis, Certainly Equivalent Approach, Decision Tree Analysis, Standard Deviation in Capital Budgeting

Sensitivity Analysis

Sensitivity analysis shows how the value of the efficiency criterion (net present value, net national value added or any other criterion) changes with variations in the value of any variable (sales volume, selling price per unit, cost per unit etc) It may be expressed as the absolute change in the efficiency criterion divided by a given percentage or absolute change in a variable or set of variables Thus, one may



say cutting in half the selling price of the output will make the value added zero. If the value added is sensitive to the variables, the project is sensitive to uncertainties and special care should be devoted to making precise estimates, particularly of those variables the estimated values of which may contain significant errors.

Sensitivity analysis may be used in early stages of project preparation to identify the variables in the estimation of which special care should be taken. In practice it is not necessary to analyse the variations of all possible variables. It is sufficient to confine the analysis to the key variables affecting the project the most, either because they are large in value as parameters or they are expected to vary considerably below or above the most likely magnitude. If value added is insensitive to the value of a particular input or output, the project is said to be insensitive to uncertainties and there is little point in trying to estimate this variable with great precision.

It follows from the above that sensitivity analysis takes into account uncertainty by calculating an efficiency indicator, not only using the best estimates of the variables under conditions of certainty, but also using other possible values. For instance, any efficiency indicator may be recalculated using pessimistic or optimistic alternatives to the "normal" or "realistic" estimate(s) applied in the first round under conditions of certainty. Sensitivity analysis provides a better understanding of which variable is in fact crucial to the project's appraisal. Such analysis will also be helpful for those in charge of managing the project later. It will indicate critical areas requiring close managerial attention in order to ensure the commercial success of a project.

Sensitivity analysis may be carried even further by testing profitability on the assumption that the pessimistic alternatives of more than one variable materialize at the same time.

Sensitivity analysis is a suitable simple tool for checking a project's sensitivity to changes in one variable or another. However, the range of estimates for one variable will usually have different probabilities of occurrence. Sensitivity analysis does not guide the investor about the possible occurrence of those values. It does not tell him which of the pessimistic and optimistic values have a higher chance of occurring and does not help him sufficiently to evaluate the risk he is taking with the investment. In some situations, sensitivity analysis gives evidence conclusive enough to take a decision: a project may be unprofitable under the best conditions of all variables or alternatively it may be profitable even in the worst circumstances. However, this will not often be the case. Moreover, some variables are likely to move simultaneously together or in opposite directions. Sensitivity then cannot be analysed by subjecting each variable to one separate recalculation.

Certainty Equivalent Approach

The certainty equivalent method (CE) adjusts for risk directly through the expected value of the cash flow in each period and then discounts these risk-adjusted cash flows by the risk-free rate of interest, R_f . The formula for this method is given as follows:

$$NPV = \sum_{t=1}^N \frac{\alpha_t \bar{X}_t}{(1 + R_f)^t} - I_0$$

While the risk-adjusted discount rate method provides a means for adjusting the riskiness of the discount rate, the certainty equivalent method adjusts the estimated value of the uncertain cash flows.

The risk-adjusted discount rate method extends the cash flow valuation model under certainty to the uncertainty case as follows:

$$V = \sum_{t=1}^N \frac{\bar{X}_t}{(1 + r_t)^t}$$

where,

V = value of Capital budgeting project,

$\bar{X}_t$ = median or mean of the expected risky cash flow t distribution X_t ,

r_t = the risk adjusted discount rate appropriate to the riskiness of the uncertain cash flows $\tilde{X}_t$,

N = the life of the project.

The certainty equivalent method uses the rationale that given a risky cash flow, the decision maker will evaluate this cash flow according to an expected utility, the utility estimate being hypothesized to be equal to utility derived from some certain cash flow amount. The decision maker performs this process for each cash flow. The valuation model is as follows:

$$V = \sum_{t=1}^N \frac{C_t}{(1+i)^t},$$

where

C_t = certainty equivalent cash flow at period t ,

i = riskless interest rate.

C_t can be expressed as a fraction of the expected value of the cash flow as follows:

$$C_t = \alpha_t \bar{X}_t,$$

where α_t = some fractional value.

The valuation formula becomes

$$V = \sum_{t=1}^N \frac{\alpha_t \bar{X}_t}{(1+i)^t}.$$

Since both models evaluate future uncertain cash flows, they should yield the same value for a given cash flow stream. The present value of each period's cash flows should be the same.

$$PV_t = \frac{\alpha_t \bar{X}_t}{(1+i)^t} = \frac{\bar{X}_t}{(1+R_t)^t}$$

$$\alpha_t = \frac{(1+i)^t}{(1+r_t)^t}$$

$$r_t = \left[\frac{(1+i)}{(\alpha_t)} \right]^{(1/t)} - 1 \quad r_{t+1} = \left[\frac{(1+i)}{(\alpha_{t+1})} \right]^{(1/(t+1))} - 1$$

From the 2 values of r at time t and $t+1$, the risk-adjusted discount rate r_t 's will be a function of (1) the investor's attitude toward risk measured by r_t , (2) the risk-free interest rate, and (3) the time period t .

The major difference between the RADR and CE methods is that the RADR method adjusts for risk in the discount rate while the CE method adjusts the cash flows for risk and then discounts at a risk-free rate of interest.

Standard Deviation in Capital Budgeting

Net present value and standard deviation of NPV are estimated in performing capital budgeting using a probabilistic distribution approach. The mean and standard deviation of the NPV distribution are defined as



$$\overline{NPV} = \sum_{t=1}^N \frac{\bar{C}_t}{(1+k)^t} + \frac{\bar{S}_t}{(1+k)^N} - I_0$$

$$\sigma_{NPV} = \left[\sum_{t=1}^N \frac{\sigma_t^2}{(1+k)^{2t}} + \sum_{T=1}^N \sum_{t=1}^N W_t W_T \text{Cov}(C_T C_t) \right]^{1/2}$$

where C_t = uncertain net cash flow in period t ,

k = risk adjusted discount rate,

S_t = salvage value,

I_0 = initial outlay,

σ^2 = variance of the cash flow,

W_T, W_t = discount factors in the T^{th} and t^{th} periods.

$\text{Cov}(C_T C_t)$ is used to measure the covariability between the cash flow in the T^{th} and t^{th} periods. $\text{Cov}(C_T C_t)$ can also be written $\sigma_{tt} \sigma_t \sigma_t$, where σ_{tt} is the correlation coefficient.

Furthermore, we can define equations that can be used to analyze investment proposals in which some of the expected cash flows are closely related (significantly correlated) and others are fairly independent. The standard deviation of NPVs for each case are:

$$NPV = \sum_{t=1}^N \frac{t}{1+k} \quad \text{perfect correlation}$$

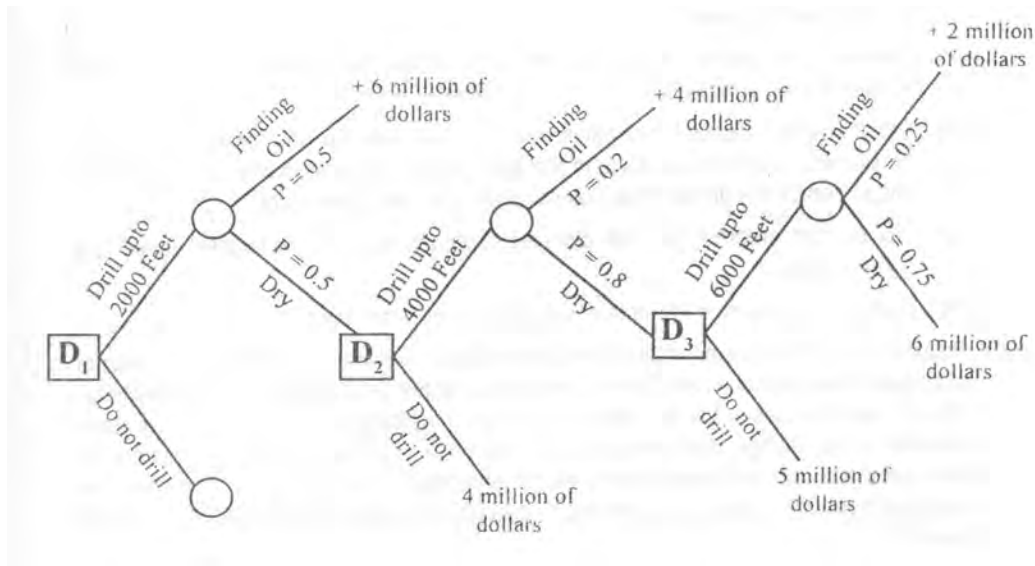
$$\sigma_{NPV} = \left[\sum_{t=1}^N \frac{\sigma_t^2}{(1+k)^{2t}} \right]^{1/2} \quad \text{mutually independent}$$

If cash flows show less than perfect correlation, this model is inappropriate and the problem must be handled with a series of conditional probability distributions. In Bonini's model, cash flow amounts are uncertain but probabilities associated with cash flows in a given period are assumed to be known. Later-period expected cash flows are highly dependent on what occurs in earlier time periods. Joint probabilities are found for the various cash flow series. Finally, the NPV for each cash flow series is calculated using the conditional probabilities. These series of NPVs are then multiplied by each joint probability and assumed. The result is the NPV and associated standard deviation for the project as a whole.

Decision Tree Analysis

The decision-tree method of capital budgeting analyzes investment opportunities involving a sequence of decisions over time. Various decision points are defined in relation to subsequent chance events. The NPV for each decision stage is computed on the series of NPV's and probabilities that branch out or follow the decision point in question. In other words, once the range of possible decisions and chance events are laid out in tree-diagram form, the NPVs associated with each decision are computed by working backwards on the diagram from the expected cash flows defined for each path on the diagram.

The given data is easily represented by the following decision tree diagram:



There are three decision points in the tree indicated by D_1 , D_2 and D_3 .

Using rolling back technique, we shall take the decision at decision point D_3 first and then use it to arrive decision at a decisions point D_2 and then use it to arrive decision at a decision point D_1 .

The optimal decision path is chosen by selecting the highest expected NPV for the first-stage decision. Standard deviations for each first-stage NPV should be computed to determine risks associated with each decision. If there is no dominant decision (e.g., if NPV is highest, but so is standard deviation), the decision becomes a function of the risk attitudes of management.

Both capital budgeting methods described use expected NPVs and risk measures associated with the NPVs.

In the probability distribution method, risk is defined in terms of the correlation among cash flows in the various time periods throughout the project's life. With each subsequent time period, later cash flow distributions are influenced by prior CF distributions. This model assumes that the CF distributions are known as are the probabilities associated with each flow, and that once an investment decision is made, the management is locked into that project decision.

In the decision-tree method, there is a sequence of investment decisions whose probability distributions can take on several values. The manager does not become locked into one decision but rather has a range of possible outcomes as a result of a prior choice from among several alternatives. Cash flows and NPVs are computed for each alternative series of possible decisions. An optimal decision path is chosen by evaluating the NPV and associated standard deviations of that NPV for each of the alternative first-stage decisions.

10.1.11 Hiller's Model & Hentz's Model

Hiller's Model

Hiller argues that the uncertainty or the risk associated with a capital expenditure proposal is shown by the standard deviation of the expected cash flows. In other words, the more certain a project is lesser would be the deviation of various cash flows from the mean cash flows. Let us take the example of a bank deposit where the rate of interest stipulated is subject to changes according to the Reserve Bank Regulations. It is also known with a fair degree of certainty that even if the rate of interest is revised downwards, the existing deposits will normally be protected. Similarly, it is known that if the rate of interest is revised upwards there is some probability that the existing deposits may also be covered. Now there



are at best two or three possible cash flows: the first at the contracted rate of interest, the second at a rate of interest one step higher and third at a rate of interest two steps higher. It is quite obvious that the standard deviation of this proposal would be much lower as compared to the standard deviation of a proposal whereby the same money is invested in a small scale unit exporting garments. In the latter case there are a large number of variables which would affect the cash inflows and therefore, the range of cash inflows would be much larger in numbers resulting in a higher standard deviation. Hillier thus argues that working out the standard deviation of the various ranges of cash flow would be helpful in the process of taking cognisance of uncertainty involved with future projects.

Hillier has developed a model to evaluate the various alternative cash flows that may arise from a capital expenditure proposal. He takes into account the mean of present value of the cash flows and the standard deviation of such cash flows, which may be determined with the help of the following formulae:

$$M = \sum_{i=0}^n (1+r)^{-1} M_i$$

$$\sigma^2 = \sum_{i=0}^n (1+r)^{-2} \sigma_i^2$$

Where, M_i is the i -th period.

R is the discounting factor and σ_i^2 is the variance of cash flows.

Example

Assume that discount rate is 10 percent and the cash flows are as follows:

Period (i)	Mean (M_i) (₹)	Standard deviation (σ_i) (₹)
0	- 16000	400
1	1500	500
2	1000	600

Note : M_i is reached by taking an average of the various probable estimates of cash flows for a particular year.

- Compute the mean of the present value distribution.
- Compute the standard deviation of the present value distribution.

Hertz's Model

Hertz has suggested that simulation technique which is a highly flexible tool of operational research may be used in capital budgeting exercise. He argues that planning problems of a firm are so complex that they cannot be described by a mathematical model. Even if we do so we may make certain inherent assumption because of which the solution is not reliable for practical purposes. Moreover, in most of the solutions due to the uncertainties involved, a satisfactory mathematical model cannot be built. He, therefore suggests that a simulation model may be developed for the investment decision making also. The suggested model for introduction of a new product developed by Hertz is given below:

	Range	(Expected value)
1. Market size	1,00,000 — 3,40,000	(1,50,000)
2. Selling prices	385 — 575	(1,50,000)
3. Market growth rate	0 — 6%	(510)
4. Eventual share of market	3 — 17%	(3%)
5. Total investment required (for computing its cost)	7 — 10	(9.5)
6. Useful life of facilities	5 — 13	(10)

7. Residual value	35 — 50	(45)
8. Operating cost	370 — 545	(450)
9. Fixed cost	253 — 375	(300)

10.1.12 Risk Adjusted Discount Rate

For a long time, economic theorists have assumed that, to allow for risk, the businessman required a premium over and above an alternative, which was risk-free. Accordingly, the more uncertain the returns in the future, the greater the risk and greater the premium required. Based on this reasoning, it is proposed that the risk premium be incorporated into the capital budgeting analysis through the discount rate. That is, if the time preference for money is to be recognized by discounting estimated future cash flows, at some risk free rate, to their present value, then, to allow for the riskiness, of those future cash flows a risk premium rate may be added to risk-free discount rate. Such a composite discount rate, called the risk-adjusted discount rate, will allow for both time preference and risk preference and will be a sum of the risk-free rate and risk-premium rate reflecting the investors' attitude towards risk. The risk-adjusted discount rate method can be formally expressed as follows:

Risk-adjusted discount rate = Risk free rate + Risk premium

Under capital asset pricing model, the risk premium is the difference between the market rate of return and the risk free rate multiplied by the beta of the project.

The risk adjusted discount rate accounts for risk by varying the discount rate depending on the degree of risk of investment projects. A higher rate will be used for riskier projects and a lower rate for less risky projects. The net present value will decrease with increasing risk adjusted rate, indicating that the riskier a project is perceived, the less likely it will be accepted. If the risk free rate is assumed to be 10%, some rate would be added to it, say 5%, as compensation for the risk of the investment, and the composite 15% rate would be used to discount the cash flows.

The **risk adjusted discount rate method (RADR)** is similar to the NPV. It is defined as the present value of the expected or mean value of future cash flow distributions discounted at a discount rate, k , which includes a risk premium for the riskiness of the cash flows from the project. It is defined by the following equation:

$$NPV = \sum_{t=1}^N \frac{\bar{X}_t}{(1+k)^t} - I_0$$

Advantages of risk adjusted discount rate

- It is simple and can be easily understood.
- It has a great deal of intuitive appeal for risk-averse businessman.
- It incorporates an attitude towards uncertainty.

Disadvantages

This approach, however, suffers from the following limitations:

- There is no easy way deriving a risk adjusted discount rate. Capital asset pricing model provides a basis of calculating the risk adjusted discount rate. Its use has yet to pick up in practice.
- It does not make any risk adjusted in the numerator for the cash flows that are forecast over the future years.
- It is based on the assumption that investor are risk-averse. Through it is generally true, there exists a category of risk seekers who do not demand premium for assuming risks; they are willing to pay



premium to take risks. Accordingly, the composite discount rate would be reduced, not increased, as the level of risk increases.

10.1.13 components of an appropriate discount rate

(A) Risk Premium Model: An appropriate discount rate (RD) for a given project is a function of the following factors —

- (i) Risk Free Rate of Return [R_F]: If a project with a risk is going to yield a return lower than the Risk Free Rate of Return, the Firm would be well off by investing its funds in the risk free security. Therefore, this is the minimum rate of return that is expected of any other investment alternative.
- (ii) Risk Premium: Extra return would mean extra risk. Risk premium is the additional return that is expected for any risky investment. It comprises of the following —
 - Firm's Normal Risk [R_N]: This is an adjustment for the Firm's normal risk. This may arise due to its capital structure, financing policy, management risk, nature of its constitution etc.
 - * Project's Risk [R_P]: This is an adjustment for the differential risk for a particular project. Example: For a new project, whose target customers are all abroad, the cash flows will be affected by Exchange Rate fluctuations. Hence, this project will carry a higher risk than other existing projects, where this exchange rate fluctuation is not a factor.
- (iii) Formula: Theoretically, the appropriate discount rate is the sum of the Risk Free Rate and the Risk Premium. Mathematically, the relationship is expressed as follows —

$$1 + R_D = (1 + R_F) \times (1 + R_N) \times (1 + R_P)$$

Where, $(1 + R_F) \times (1 + R_N)$ constitutes the average cost of capital of the Firm.

(B) Inflation Adjusted Rate: Appropriate discount rate for evaluating the project cash flows, which are expressed in nominal terms (i.e. the actual estimated cash flow in money terms), should be a factor of the following —

- (i) Real Rate of Return [R_R]: This is the discount rate that should be applied in respect of cash flows in a static economy, i.e. there are no inflation / deflation or cash flows are not affected by inflation.
- (ii) Inflation [I]: Real Rate should be adjusted for inflation, i.e. increased by the inflation rate to ascertain the appropriate discount rate.
- (iii) Formula: Theoretically, the appropriate discount rate is the sum of the Real Discount Rate and Inflation Rate. Mathematically, the relationship is expressed as follows —

$$1 + R_D = (1 + R_R) \times (1 + I)$$

10.1.14 Options in Capital Budgeting

Option is right to do an activity, which does not carry any obligation to do the same. Options in Capital Budgeting refers to those rights or choices purchased, whereby, the Firm can choose whether or not to exercise the option depending upon the outcomes till that point.

$$\text{Value of Option} = \text{NPV with Option} - \text{NPV without Option}$$

[Note: Generally, the price of the option would be available, and the requirement would be to ascertain the project worth by considering the value of option as an alternative cash flow.]

Circumstances

- (i) The concept of Options in Capital Budgeting arises in scenarios of uncertainty in cash flows. Since Capital Budgeting involves huge capital outlay and generally the decision is not reversible, negative effect of uncertainty can cripple an organisation.

- (ii) Generally, the viability or otherwise of a project will be known only after a certain point in time. Only at that time a clearer picture will emerge, putting at rest to major portion of uncertainty. However, waiting for that clearer picture may also result in losing an opportunity.

Examples:

- (a) Option to Expand: An important option is to expand production if conditions turn favourable and to contract production if conditions turn bad. The former is sometimes called a growth option, and the latter may actually involve the shutdown of production.
- (b) Option to Abandon: If a project has abandonment value, selling off the project on "as is where is" basis. This represents a put option (i.e. right to sell). Example: A Flat Promoter may dispose of his unfinished building to an Industrial House or another Flat Promoter, instead of proceeding further to sell it as individual units.
- (c) Option to Postpone: The option to postpone, also known as an investment timing option. For some projects there is the option to wait, thereby obtaining new information.



Illustration 1.

Alpha Limited is faced with a decision to purchase or acquire on lease a mini car. The cost of the mini car is ₹ 2,53,930. It has a life of 5 year The mini car can be obtained on lease by paying equal lease rentals annually. The leasing company desires a return of 10% on the gross value of the asset. Alpha Limited can also obtain 100% finance from its regular banking channel. The rate of interest will be 15% p.a. and the loan will be paid in five annual equal instalments, inclusive of interest. The effective tax rate of the company is 40%. For the purpose of taxation it is to be assumed that the asset will be written off over a period of 5 years on a straight line basis.

- (a) Advise Alpha Limited about the method of acquiring the car.
- (b) What should the annual lease rental to be charged by the leasing company to match the loan option?

For your exercise use the following discount factors:

Years					
Discount rate	1	2	3	4	5
10%	0.91	0.83	0.75	0.68	0.62
15%	0.87	0.76	0.66	0.57	0.49
9%	0.92	0.84	0.77	0.71	0.65

Solution :

(a) Alpha Ltd.

Computation of annual loan repayment instalment

$$\frac{\text{Loan amount}}{\text{Annuity Factor of 15\%}} = ₹ \frac{2,53,930}{3.86} = ₹ 65,785$$

Note: Annuity factor is based on the assumption that loan instalment is repaid at the beginning of the year to be at par with lease rentals. Such annuity factor at 15% works out to be 3.86.

Computation of interest in debt payments

					(₹)
Year	0	1	2	3	4
Opening Balance of Principal	2,53,930	1,88,145	1,50,582	1,07,384	57,707
Interest @ 15%	–	28,222	22,587	16,108	8,078
Total	2,53,930	2,16,237	1,73,169	1,23,492	65,785
Repayment of Instalment	65,785	65,785	65,785	65,785	65,785
Closing Balance	1,88,145	1,50,582	1,07,384	57,707	Nil

*Difference between the instalment amount and opening balance of 4th year.

Schedule of Cash Outflows in debt financing

(₹)

End of year	Annual loan repayment instalment	Interest @ 15%	Depreciation	Tax shield	Net cash outflows	PV factor at 9%	Present value of cash flow at 9%
	(1)	(2)	(3)	(4)	(5)		(6)
				$[(2) + (3) \times t] / (1 - (4))$			
0	65,785	-	-	-	65,785	1.00	65,785
1	65,785	28,222	50,786	31,603	34,182	0.92	31,447
2	65,785	22,587	50,786	29,349	36,436	0.84	30,606
3	65,785	16,108	50,786	26,758	39,027	0.77	30,189
4	65,785	8,078	50,786	23,546	42,239	0.71	29,990
5	-	-	50,786	20,314	(20,314)	0.65	(13,204)
		Total					₹ 1,74,813

Computation of Annual lease rentals:

$$\frac{\text{Cost of assets}}{\text{Annuity Factor of 10\%}} = ₹ \frac{2,53,930}{4.17} = ₹ 60,894$$

Schedule of Cash outflows – Leasing alternative

(₹)

End of year	Lease payment	Tax shield	After tax cash out flows	PV factor at 9%	Present value of cash flow at 9%
0	60,894	-	60,894	1.00	60,894
1-4	60,894	24,358	36,536	3.24	1,18,377
5	-	24,358	(24,358)	0.65	(15,833)
Total Present Value =		1,63,438			

Decision: The present value of cash outflows under lease financing is ₹ 1,63,438 while that of debt financing (i.e. owning the asset) is ₹ 1,74,813. Thus leasing has an advantage over ownership in this case.

(b) Let the annual lease rentals be X.

Therefore, the after tax cost of lease rentals will be $0.60 \times$

Present value will be $0.60x \times ₹ 4.17 = 2.502x$

Equating $2.502x = ₹ 1,74,813$; the value of x is obtained at ₹ 69,869.

Therefore the lease rentals should be ₹ 69,869 to match the loan option.

Illustration 2.

Nine Gems Ltd. has just installed Machine – R at a cost of ₹ 2,00,000. The machine has a five year life with no residual value. The annual volume of production is estimated at 1,50,000 units, which can be sold at ₹ 6 per unit. Annual operating costs are estimated at ₹ 2,00,000 (excluding depreciation) at this output level. Fixed costs are estimated at ₹ 3 per unit for the same level of production.

Nine Gems Ltd. has just come across another model called Machine – S capable of giving the same



output at an annual operating cost of ₹ 1,80,000 (exclusive of depreciation). There will be no change in fixed costs. Capital cost of this machine is ₹ 2,50,000 and the estimated life is for five years with nil residual value. The company has an offer for sale of Machine – R at ₹ 1,00,000. But the cost of dismantling and removal will amount to ₹ 30,000. As the company has not yet commenced operations, it wants to sell Machine – R and purchase Machine –S. Nine Gems Ltd. will be a zero-tax company for seven years in view of several incentives and allowances available.

The cost of capital may be assumed at 15%. P.V. factors for five years are as follows:

Year	P.V. Factors
1	0.8696
2	0.7561
3	0.6575
4	0.5717
5	0.4972

- (i) Advise whether the company should opt for the replacement.
- (ii) Will there be any change in your view, if Machine-R has not been installed but the company is in the process of selecting one or the other machine?

Support your view with necessary workings.

Solution :

(i) Replacement of Machine – R:

Incremental cash out flow

	₹
(i) Cash outflow on Machine – S	2,50,000
Less: Sale value of Machine – R	
Less: Cost of dismantling and removal (₹1,00,000 – ₹30,000)	70,000
Net outflow	1,80,000
Incremental cash flow from Machine –S	
Annual cash flow from Machine – S	2,70,000
Annual cash flow from Machine – R	2,50,000
Net incremental cash in flow	20,000

Present value of incremental cash in flows = ₹ 20,000 ₹ (0.8696 + 0.7561 + 0.6575 + 0.5717 + 0.4972)
= 20,000 x 3.3523 = ₹ 67,046

NPV of Machine – S = ₹ 67,046 – ₹ 1,80,000 = (–) ₹ 1,12,954.

₹ 2,00,000 spent on Machine – R is a sunk cost and hence it is not relevant for deciding the replacement.

Decision: Since Net present value of Machine –S is in the negative, replacement is not advised.

If the company is in the process of selecting one of the two machines, the decision is to be made on the basis of independent evaluation of two machines by comparing their Net present values.

(ii) Independent evaluation of Machine– R and Machine –S

	Machine– R	Machine– S
Units produced	1,50,000	1,50,000
Selling price per unit (₹)	6	6
Sale value	9,00,000	9,00,000
Less: Operating Cost (exclusive of depreciation)	2,00,000	1,80,000
Contribution	7,00,000	7,20,000
Less: Fixed cost	4,50,000	4,50,000
Annual Cash flow	2,50,000	2,70,000
Present value of cash flows for 5 years	8,38,075	9,05,121
Cash outflow	2,00,000	2,50,000
Net Present Value	6,38,075	6,55,121

As the NPV of Cash in flow of Machine-S is higher than that of Machine-R, the choice should fall on Machine-S.

Note: As the company is a zero tax company for seven years (Machine life in both cases is only for five years), depreciation and the tax effect on the same are not relevant for consideration.

Illustration 3.

Excel Ltd. manufactures a special chemical for sale at ₹ 40 per kg. The variable cost of manufacture is ₹ 25 per kg. Fixed cost excluding depreciation is ₹ 2,50,000. Excel Ltd. is currently operating at 50% capacity. It can produce a maximum of 1,00,000 kgs at full capacity.

The Production Manager suggests that if the existing machines are fully replaced the company can achieve maximum capacity in the next five years gradually increasing the production by 10% per year. The Finance Manager estimates that for each 10% increase in capacity, the additional increase in fixed cost will be ₹ 50,000. The existing machines with a current book value of ₹ 10,00,000 can be disposed of for ₹ 5,00,000. The Vice-President (finance) is willing to replace the existing machines provided the NPV on replacement is about ₹ 4,53,000 at 15% cost of capital after tax.

(i) You are required to compute the total value of machines necessary for replacement.

For your exercise you may assume the following:

- The company follows the block assets concept and all the assets are in the same block. Depreciation will be on straight-line basis and the same basis is allowed for tax purposes.
- There will be no salvage value for the machines newly purchased. The entire cost of the assets will be depreciated over five year period.
- Tax rate is at 40%.
- Cash inflows will arise at the end of the year.
- Replacement outflow will be at the beginning of the year (year 0).

(f) Year	0	1	2	3	4	5
Discount Factor at 15%	1	0.87	0.76	0.66	0.57	0.49

- (ii) On the basis of data given above, the managing director feels that the replacement, if carried out, would at least yield post tax return of 15% in the three years provided the capacity build up is 60%, 80% and 100% respectively. Do you agree?

**Solution :**

- (i) Computation of the total replacement value of machine. (Assuming that existing machines also have valid life for 5 years)

Step 1 : Incremental Cash Inflows

Year	1	2	3	4	5
Incremental Capacity	10%	20%	30%	40%	50%
Incremental production and sales (Kgs.)	10,000	0,000	30,000	40,000	50,000
	₹	₹	₹	₹	₹
Incremental contribution	1,50,000	3,00,000	4,50,000	6,00,000	7,50,000
Incremental Fixed cost	50,000	1,00,000	1,50,000	2,00,000	2,50,000
Incremental PBTD	1,00,000	2,00,000	3,00,000	4,00,000	5,00,000
Tax at 40%	40,000	80,000	1,20,000	1,60,000	2,00,000
Incremental PAT BD	60,000	1,20,000	1,80,000	2,40,000	3,00,000
Discount factors	0.87	0.76	0.66	0.57	0.49
Discounted value of PAT BD	52,200	91,200	1,18,800	1,36,800	1,47,000
Total for 5 years	5,46,000				

Step 2: Incremental Cash outflow

Let the total cost of replacement	X
Disposal value of existing machines	5,00,000
Incremental cash outflow	(X – 5,00,000)

Step 3: Tax savings on depreciation

= (Incremental block/5) x Tax rate x (Annuity factor of 15% for 5 years)

= [(X – 5,00,000)/5] x 40% x 3.35 = 0.268 X – 1,34,000

Step 4: Total Discounted cash inflows

Total incremental discounted cash inflows : 5,46,000 + .268X – 1,34,000 = 4,12,000 + .268 X

Step 5: Equation

NPV = Sum of discounted cash inflows – Sum of the discounted cash outflows

4,53,000 = (4,12,000 + .268 X) – (X – 5,00,000)

4,53,000 = 4,12,000 + .268 X – X + 5,00,000

4,53,000 – 4,12,000 – 5,00,000 = .268 X – X

– 4,59,000 = –0.732 X

Or 0.732 X = 4,59,000

Or X = 4,59,000/0.732 = ₹ 6,27,049

- (ii) Evaluation whether replacement would yield post tax return of 15% in 3 years

	1	2	3
Incremental capacity	10%	30%	50%
Incremental PBTD	1,00,000	3,00,000	5,00,000
Depreciation (6,27,049 – 5,00,000)/5	25,410	25,410	25,410
Incremental PBT	74,590	2,74,590	4,74,590

Tax at 40%	29,836	1,09,836	1,89,836
Incremental PAT	44,754	1,64,754	2,84,754
PAT + Depreciation	70,164	1,90,164	3,10,164
Discount factors	0.87	0.76	0.66
Discounted cash inflows	61,043	1,44,525	2,04,708
Total discounted cash inflow	4,10,276		
Discounted incremental cash outflow	1,27,049		
NPV	2,83,227		

Conclusion: As the net present value is positive the view of the Managing Director is correct.

Alternative Solution:

(i) Cash inflows:

			(Figures in lakhs of ₹)		
Capacity	60%	70%	80%	90%	100%
Sales	18.00	21.00	24.00	27.00	30.00
Less: Variable cost	9.00	10.50	12.00	13.50	15.00
Contribution (A)	9.00	10.50	12.00	13.50	15.00
Less: Fixed cost (B)	3.00	3.50	4.00	4.50	5.00
Profit before (C)	6.00	7.00	8.00	9.00	10.00
Depreciation & Tax					
Discount factors (D)	0.87	0.76	0.66	0.57	0.49
Present value PATBD (E)	5.22	5.32	5.28	5.13	4.90
(C × D)					
Sum Total of Present Values in E (F)	` 25.85				

After Tax present Values (G) = $(1 - T) F = ₹ 25.85 \times 0.6 = ₹ 15.51$

Tax savings on depreciation

Let 'X' be the cost of machines purchased.

The salvage value of old machine is ₹ 5 lakhs.

\Net outflow of new machines would be $(X - 5)$ lakhs.

Depreciation on straight line basis on this would be $\left(\frac{X-5}{5}\right)$ lakhs

Which will be the same for 5 years

The present value of such recurring Depreciation in equal sum would be $\left(\frac{X-5}{5}\right) \times 3.35$

Note: 3.35 is the sum total of present values for 5 years of uniform flow.

Tax saving on such depreciation is $\left(\frac{X-5}{5}\right) \times 3.35 \times 0.4 = ₹ 0.268 \times ₹ 1.34$

**Equation:**

Net present value of replacement = In flows in N years – outflow in the year 0.

According to the Vice-President (Finance) NPV should be equal to ₹ 4.53 lakhs.

Hence, the equation $0.268 X - 1.34 + 15.51 - (X - 5) = 4.53$

$= 0.268 X + 14.17 - X + 5 = 4.53$ lakhs

or $0.732 X = 14.64$ lakhs

$$X = \frac{14.64}{0.732} = ₹ 20.00 \text{ lakhs.}$$

The cost of new machines is ₹ 20 lakhs.

(ii)			(₹ in lakhs)		
Capacity		60%	80%	100%	
Profit before Depreciation & Taxes	(A)	6.00	8.00	10.00	
Less: Depreciation	(B)	5.00	5.00	5.00	
Profit after Depreciation (A – B)	(C)	1.00	3.00	5.00	
Less: Tax @ 40%	(D)	0.40	1.20	2.00	
Profit after tax	(E)	0.60	1.80	3.00	
Profit after tax but Depreciation added back i.e. inflow (B + E)	(F)	5.60	6.80	8.00	
Discount factor	(G)	0.87	0.76	0.66	
Present values of (F)	(H)	4.872	5.168	5.28	
Net Present Value (I)					
=Total of (H) – Initial outflow = ₹ 15.32 – 15.00 = ₹ 0.32 lakhs					

As the Net Present Value is positive. The view of the Managing Director is correct.

Illustration 4.

S Engineering Company is considering to replace or repair a particular machine, which has just broken down. Last year this machine costed ₹ 2,00,000 to run and maintain. These costs have been increasing in real terms in recent years with the age of the machine. A further useful life of 5 years is expected, if immediate repairs of ₹ 1,90,000 are carried out. If the machine is not repaired it can be sold immediately to realize about ₹ 50,000 (Ignore loss/gain on such disposal).

Alternatively, the company can buy a new machine for ₹ 4,90,000 with an expected life of 10 years with no salvage value after providing depreciation on straight line basis. In this case, running and maintenance costs will reduce to ₹ 1,40,000 each year and are not expected to increase much in real term for a few years at least. S Engineering Company regard a normal return of 10% p.a. after tax as a minimum requirement on any new investment. Considering capital budgeting techniques, which alternative will you choose? Take corporate tax rate of 50% and assume that depreciation on straight line basis will be accepted for tax purposes also. Given cumulative present value of ₹ 1 p.a. at 10% for 5 years ₹ 3.791, 10 years ₹ 6.145.

Solution :

Evaluation of proposal to repair existing machine or buy a new machine for M/s S. Engineering Company

(i) To repair existing machine:

	₹
Present value of after-tax cash outflows	
Cost of repairs immediately net of tax ₹ 95,000 (50% of ₹ 1,90,000)	
Equivalent annual cost for 5 years $\frac{₹ 95,000}{3.791}$	25,059
Running and maintenance cost per annum net of tax (50% of ₹ 2,00,000)	1,00,000
Total net equivalent cash outflows p.a.	1,25,059

(ii) To buy a new machine:

	₹
Present value of after-tax cash outflows	
Purchase cost of new machine	4,90,000
Less: Sale Proceeds of old machine	50,000
	4,40,000
Equivalent annual cost for 10 years $\frac{₹ 4,40,000}{6.145}$	71,603
Tax saving of depreciation (₹ 4,90,000/10) ₹ 50%	(24,500)
Running and maintenance cost p.a. net of tax (50% of ₹ 1,40,000)	70,000
Total net equivalent cash outflows p.a.	1,17,103

Since, net equivalent cash outflows p.a. for buying a new machine ₹ 1,17,103 is less than net equivalent cash outflows of ₹ 12,506 for repairing of an existing machine. Therefore, it is advisable that the company should go for buying a new machine.

(Second Solution)

(i) To repair an existing machine:

	₹
Present value of after-tax cash outflow	
Cost of repairs immediately net of tax (₹ 1,90,000 x 50%)	95,000
Running and maintenance cost for 5 years (₹ 2,00,000 x 50% ₹ 3.791)	3,79,100
Total net present value of after tax cash outflows for 5 years	4,74,100
Hence, net equivalent cash outflows p.a. = $\frac{₹ 4,74,00}{3.791}$	1,25,059

(ii) To Buy new machine

		₹
Present value of after-tax cash outflow		
Purchase cost of new machine	4,90,000	



Less: Sale proceeds of old machine	50,000	4,40,000
Tax benefit on depreciation p.a. ($\text{₹ } 4,90,000/10$) $\times$ 50%	(24,500)	
Running and maintenance cost p.a. (50% of $\text{₹ } 1,40,000$)	70,000	
	45,500	
Net cash outflows for 10 years ($\text{₹ } 45,500 \times 6.145$)		2,79,598
Total net present value of after tax cash outflows for 10 years		7,19,598
Hence, net equivalent cash outflow p.a. = $\frac{7,19,55,000}{6.145}$		1,17,103

Since, net equivalent cash outflows p.a. for buying a new machine ₹ 1,17,103 is less than net equivalent outflows of ₹ 1,25,509 for repairing of an existing machine. Therefore, it is advisable that the company should go for buying a new machine.

Illustration 5.

A limited company operates a lodging house with a restaurant, shops and recreational facilities attached. Its manager has entrusted you with the planning of the coming year's operations, more particularly on the level of profits the company was likely to earn. The lodging house has 100 double-bed rooms, which are likely to be rented at ₹ 150 per day. The manager expects an occupancy ratio of 70% for a period of 250 days during the tourist season. It is also anticipated that both the beds in a room will be occupied during the period. Each person staying in the lodging house is expected to spend, on the basis of past statistics, ₹ 30 per day in the shops attached to the lodge and ₹ 60 per day in the restaurant. The recreational facilities are not charged to the customer.

Some other relevant data available to you is as under:

(i) Variable cost to volume ratio:

	Shops	Restaurant
Cost of goods sold	40%	30%
Supplies	5%	15%
Others	5%	10%

(ii) For the lodging house, the variable costs are ₹ 25 per day per occupied room for cleaning, laundry etc.

(iii) Annual fixed costs for the entire complex are ₹ 19,50,000.

From the above, you are required to prepare:

(a) an income statement for the coming year; and

(b) an analysis to indicate whether the manager's suggestion of reducing the room rent to ₹ 120 per day to enhance the occupancy ratio to 80% should be accepted.

Solution :**(a) Expected Income Statement of A Ltd. Company**

(A) Revenue:		₹
Hotel Room receipts (100 rooms x 250 days x ₹ 150 x 70%)		26,25,000
Shops (100 rooms x 2 persons x 250 days x ₹ 30 x 70%)		10,50,000
Restaurant (100 rooms x 2 persons x 250 days x ₹ 60 x 70%)		21,00,000
		57,75,000
(B) Variable costs:	₹	₹
Hotel Room (100 rooms x 250 days x ₹ 25 x 70%)	4,37,500	
Shops (₹ 10,50,000 x 50%)	5,25,000	
Restaurant (₹ 21,00,000 x 55%)	11,55,000	16,80,000
(C) Contribution (A – B)		40,95,000
Less: Fixed costs		19,50,000
Expected profits		21,45,000

(b) Income Statement based on Manger's suggestions

(A) Revenue:		₹
Hotel Room receipts (100 rooms x 250 days x ₹ 120 x 80%)		24,00,000
Shops (100 rooms x 2 persons x 250 days x ₹ 30 x 80%)		12,00,000
Restaurant (100 rooms x 2 persons x 250 days x ₹ 60 x 80%)		24,00,000
		60,00,000
(B) Variable costs:	₹	₹
Hotel Room (100 rooms x 250 days x ₹ 25 x 80%)	5,00,000	
Shops (₹ 12,00,000 x 50%)	6,00,000	
Restaurant (₹ 24,00,000 x 55%)	13,20,000	24,20,000
(C) Contribution (A – B)		35,80,000
Less: Fixed costs		19,50,000
Profits		16,30,000

The profit based on manager's suggestion ₹ 16,30,000 is lower than the expected profit ₹ 21,45,000 , therefore, it is advisable that the manager's suggestion of reducing the room rent to ₹ 125 per day to enhance the occupancy ratio to 80% should not be accepted.

Illustration 6.

(a) Following are the data on a capital project being evaluated by the management of X Ltd.

	Project M
	₹
Annual cost saving	4,00,000
Useful life	4 years
I.R.R.	15%
Profitability Index (PI)	1.064
NPV	?
Cost of capital	?



Cost of project	?
Payback	?
Salvage value	0

Find the missing values considering the following table of discount factor only:

Discount factor	15%	14%	13%	12%
1 year	0.869	0.877	0.885	0.893
2 years	0.756	0.769	0.783	0.797
3 years	0.658	0.675	0.693	0.712
4 years	0.572	0.592	0.613	0.636
	2.855	2.913	2.974	3.038

(b) S Ltd. has ₹ 10,00,000 allocated for capital budgeting purposes. The following proposals and associated profitability indexes have been determined:

Project	Amount	Profitability Index
	₹	
1	3,00,000	1.22
2	1,50,000	0.95
3	3,50,000	1.20
4	4,50,000	1.18
5	2,00,000	1.20
6	4,00,000	1.05

Which of the above investments should be undertaken? Assume that projects are indivisible and there is no alternative use of the money allocated for capital budgeting.

Solution:

(a) Cost of Project M

At 15% I.R.R., the sum total of cash inflows = Cost of the project i.e. Initial cash outlay

Given:

Annual cost saving ₹ 4,00,000

Useful life 4 years

I.R.R. 15%

Now, considering the discount factor table @ 15% cumulative present value of cash inflows for 4 years is 2.855. Therefore, Total of cash inflows for 4 years for Project M is (₹ 4,00,000 × 2.855) = ₹ 11,42,000

Hence cost of project is = ₹ 11,42,000

Payback period of the Project M

Pay back period = $\frac{\text{Cost of the project}}{\text{Annuity cost saving}} = \frac{₹ 11,42,000}{4,00,000}$

= 2.855 or 2 years 11 months approximately

Cost of Capital

If the profitability index (PI) is 1, cash inflows and outflows would be equal. In this case, (PI) is 1.064. Therefore, cash inflows would be more by 0.64 than outflow.

$$\text{Profitability index (PI)} = \frac{\text{Discounted Cash inflows}}{\text{Cost of the project}}$$

$$\text{or } 1.064 = \frac{\text{Discounted Cash inflows}}{\text{₹11,42,000}}$$

or $1.064 \times \text{₹ } 11,42,000 = \text{₹ } 12,15,088$. Hence, Discounted cash inflows = ₹ 12,15,088

Since, Annual cost saving is ₹ 4,00,000. Hence, cumulative discount factor for 4 years

$$= \text{₹ } 12,15,000 / 4,00,000$$

$$= 3.037725 \text{ or } 3.038$$

Considering the discount factor table at discount rate of 12%, the cumulative discount factor for 4 years is 3.038. Hence, the cost of capital is 12%.

Net present value of the project.

N.P.V. = Total present value of cash inflows – Cost of the project

$$= \text{₹ } 12,15,088 - \text{₹ } 11,42,000$$

$$= \text{₹ } 73,088.$$

(b) Statement showing ranking of projects on the basis of Profitability Index

Project	Amount	P.I.	Rank
1	3,00,000	1.22	1
2	1,50,000	0.95	5
3	3,50,000	1.20	2
4	4,50,000	1.18	3
5	2,00,000	1.20	2
6	4,00,000	1.05	4

Assuming that projects are indivisible and there is no alternative use of the money allocated for capital budgeting on the basis of P.I., the S Ltd., is advised to undertake investment in projects 1, 3, and 5. However, among the alternative projects the allocation should be made to the projects which adds the most to the shareholders wealth. The NPV method, by its definition, will always select such projects.

Statement showing NPV of the projects

Project	Amount (₹)	P.I.	Cash inflows of project (₹)	N.P.V. of Project (₹)
(i)	(ii)	(iii)	(iv) = [(ii) x (iii)]	(v) = [(iv) – (ii)]
1	3,00,000	1.22	3,66,000	66,000
2	1,50,000	0.95	1,42,500	(-)7,500
3	3,50,000	1.20	4,20,000	70,000
4	4,50,000	1.18	5,31,000	81,000
5	2,00,000	1.20	2,40,000	40,000
6	4,00,000	1.05	4,20,000	20,000

The allocation of funds to the projects 1, 3 and 5 (as selected above on the basis of P.I.) will give N.P.V. of ₹ 1,76,000 and ₹ 1,50,000 will remain unspent.



However, the N.P.V. of the projects 3, 4 and 5 is ₹ 1,91,000 which is more than the N.P.V. of projects 1, 3 and 5. Further, by undertaking projects 3, 4 and 5 no money will remain unspent. Therefore, S Ltd. is advised to undertake investments in projects 3, 4 and 5.

Illustration 7.

- (a) A company is considering two mutually exclusive projects X and Y. Project X costs ₹ 3,00,000 and Project Y ₹ 3,60,000. You have been given below the net present value, probability distribution for each project:

Project X		Project Y	
NPV Estimate	Probability	NPV Estimate	Probability
₹		₹	
30,000	0.1	30,000	0.2
60,000	0.4	60,000	0.3
1,20,000	0.4	1,20,000	0.3
1,50,000	0.1	1,50,000	0.2

- (i) Compute the expected net present value of Projects X and Y.
(ii) Compute the risk attached to each project i.e., Standard Deviation of each probability distribution.
(iii) Which project do you consider more risky and why?
(iv) Compute the profitability index of each project.
(b) Determine the risk adjusted net present value of the following projects:

	A	B	C
Net cash outlays (₹)	1,00,000	1,20,000	2,10,000
Project life	5 years	5 years	5 years
Annual cash inflow (₹)	30,000	42,000	70,000
Coefficient of variation	0.4	0.8	1.2

The company selects the risk-adjusted rate of discount on the basis of the co-efficient of variation:

Coefficient of variation	Risk adjusted rate of discount	Present value factor 1 to 5 years at risk adjusted rate of discount
0.0	10%	3.791
0.4	12%	3.605
0.8	14%	3.433
1.2	16%	3.274
1.6	18%	3.127
2.0	22%	2.864
More than 2.0	25%	2.689

Answer**(a) Project X**

NPV Estimate	Probability	NPV Estimate x Probability	Deviation from Expected NPV i.e. ₹ 90,000	Square of the deviation	Square of the deviation x Probability
₹		₹		₹	₹
30,000	0.1	3,000	60,000	36,00,000,000	3,60,000,000
60,000	0.4	24,000	30,000	9,00,000,000	3,60,000,000
1,20,000	0.4	48,000	-30,000	9,00,000,000	3,60,000,000
1,50,000	0.1	15,000	-60,000	36,00,000,000	3,60,000,000
Expected NPV		90,000			14,40,000,000

Project Y

NPV Estimate	Probability	NPV Estimate x Probability	Deviation from Expected NPV i.e. ₹ 90,000	Square of the deviation	Square of the deviation x Probability
₹		₹		₹	₹
30,000	0.2	6,000	60,000	36,00,000,000	7,20,000,000
60,000	0.3	18,000	30,000	9,00,000,000	2,70,000,000
1,20,000	0.3	36,000	-30,000	9,00,000,000	2,70,000,000
1,50,000	0.2	30,000	-60,000	36,00,000,000	7,20,000,000
Expected NPV		90,000			19,80,000,000

(i) The expected net present value of Projects X and Y is ₹ 90,000 each.

(ii) Standard Deviation = $\sqrt{\text{Square of the deviation} \times \text{probability}}$

In case of Project X : Standard Deviation = $\sqrt{\text{₹ } 14,40,000,000}$
 $= \text{₹ } 37,947$

In case of Project Y : Standard Deviation = $\sqrt{\text{₹ } 19,80,000,000}$
 $= \text{₹ } 44,497$

(iii) Coefficient of variation = $\frac{\text{Standard deviation}}{\text{Expected net present value}}$

In case of Project X : Coefficient of variation = $\frac{37,947}{90,000} = 0.42$

In case of Project Y : Coefficient of variation = $\frac{44,497}{90,000} = 0.4944$ or 0.50

Project Y is riskier since it has a higher coefficient of variation.

(iv) Profitability index = $\frac{\text{Discounted cash inflow}}{\text{Discounted cash outflow}}$

In case of Project X : Profitability Index = $\frac{90,000 + 3,00,000}{3,00,000} = 1.30$

In case of Project Y : Profitability Index = $\frac{90,000 + 3,60,000}{3,00,000} = \frac{4,50,000}{3,00,000} = 1.25$



(b) Statement showing the determination of the risk adjusted net present value

Pro- jects	Net cash outlays	Coefficient of variation	Risk adjust- ed discount rate	Annual cash in- flow	PV factor 1-5 years at risk adjusted rate of discount	Discount- ed cash inflow	Net present value
	₹			₹	₹	₹	₹
(I)	(ii)	(iii)	(iv)	(v)	(vi)	(vii) = (v) x (vi)	(viii) = (vii) - (ii)
A	1,00,000	0.4	12%	30,000	3.605	1,08,150	8,150
B	1,20,000	0.8	14%	42,000	3.433	1,44,186	24,186
C	2,10,000	1.20	16%	70,000	3.274	2,29,180	19,180

Illustration 8.

C developed original specification of a product and founded C Manufacturing Ltd. In 2009 the firm manufactured 980 Nos. at an average price of ₹ 900 each. In 2010 due to continuous price rise of the inputs, he raised his prices at an average of 12%, since he knew he could sell his plant's full capacity of 980 Nos. per year. In spite of price rise for the product, which sold for over ₹ 1,000 for the first time, C was surprised to learn in late 2010 (as may be seen from the financial statements) that C Manufacturing Ltd. show a decline in earnings and still worse, decline in cash flow.

His accountant has brought the following:

- We are following FIFO system for the purpose of issues.
- Costs are going up faster than 12% and they will go up further in 2011.
- We are not setting aside enough to replace the machinery; we need to set aside ₹ 1,65,000, not ₹ 1,50,000 so as to be able to buy new machinery.
- It is still not late to switch to LIFO for 2010. This will reduce closing inventory to ₹ 3,30,000 and raise cost of goods sold.

	C Manufacturing Ltd.		Income Statement (₹ 000)	
		2010		2009
Sales		1,008		900
Cost of goods sold				
Opening inventory	320		250	
Raw material	500		400	
Labour	200		174	
Depreciation	150		150	
End inventory	(-)390		(-)320	
		780		654
Gross margin		228		246
Administration expenses		100		92
EBIT		128		154
Interest		50		50
		78		104
Income-tax		39		52
Profit after tax		39		52
Add: Non-cash expenses		150		150
Inventory change		(-)70		(-)70
Cash flow		119		132

Required:

- (1) What is the weighted average inflation factor for the firm using LIFO?
- (2) If the firm desires a 15 per cent profit margin on sales, how much should the firm charge for the product per unit?

Solution :**(1)**

(& 000)

	2010		2009	
	Expenses		Expenses	
Raw material				
Opening inventory	320		250	
Add: Purchases	500		400	
	820		650	
Less: Closing inventory based on LIFO*	330	490	320	330
Labour		200		174
Depreciation		165*		150
Cost of goods sold		855		654
Add: Administration expenses		100		92
		955		746

*considered on replacement cost basis.

Hence, weighted average inflation factor for the firm in 2010 = $\frac{955}{746}$
 = 1.28 i.e. 28% over 2009

(2) If the firm desires a 15 per cent profit margin on sales the price which the firm should charge for the product per unit can be identified in two ways:-

(i) In 2009, EBIT as a percentage of sales was 17.1%.

Hence, if we take the weighted average inflation in 2010 over 2009 and increase prices to that extent the charge per product in 2010 will be

$$\text{₹ } \frac{9,00,000}{980} \times 1.28 = 1,175.50$$

, or in other words

Average price in 2009 $\times (1 + \text{inflation \%})$

$$= \text{₹ } 918.36 \times 1.28 = \text{₹ } 1,175.50 \text{ per product}$$

i.e. Total sales will be (₹ 1,175.50 $\times$ 980 Nos.) = ₹ 11,52,000 approximately

Alternatively,

(ii) Total cost in 2010, for 980 Nos. is ₹ 9,55,000.

Hence, for each No. = ₹ 974.50.

In order to earn 15% profit margin on sales (EBIT level), the sales price per product will be

$$\text{₹ } \frac{974.50}{0.85} = \text{₹ } 1,146.50$$

Total sales will be (₹ 1,146.50 $\times$ 980 Nos.) = ₹ 11,23,570 [**Note:** Figures have been rounded off.]



Illustration 9.

A large profit making company is considering the installation of a machine to process the waste produced by one of its existing manufacturing process to be converted into a marketable product. At present, the waste is removed by a contractor for disposal on payment by the company of ₹ 50 lakhs per annum for the next four year. The contract can be terminated upon installation of the aforesaid machine on payment of a compensation of ₹ 30 lakhs before the processing operation starts. This compensation is not allowed as deduction for tax purposes.

The machine required for carrying out the processing will cost ₹ 200 lakhs to be financed by a loan repayable in 4 equal instalments commencing from the end of year 1. The interest rate is 16% per annum. At the end of the 4th year, the machine can be sold for ₹ 20 lakhs and the cost of dismantling and removal will be ₹ 15 lakhs.

Sales and direct costs of the product emerging from waste processing for 4 years are estimated as under:

	₹ in lakhs			
Year	1	2	3	4
Sales	322	322	418	418
Material consumption	30	40	85	85
Wages	75	75	85	100
Other expenses	40	45	54	70
Factory overheads	55	60	110	145
Depreciation (as per income-tax rules)	50	38	28	21

Initial stock of materials required before commencement of the processing operations is ₹ 20 lakhs at the start of year 1. The stock levels of materials to be maintained at the end of year 1, 2 and 3 will be ₹ 55 lakhs and the stocks at the end of year 4 will be nil. The storage of materials will utilize space which would otherwise have been rented out for ₹ 10 lakhs per annum. Labour costs include wages of 40 workers, whose transfer to this process will reduce idle time payments of ₹ 15 lakhs in year 1 and ₹ 10 lakhs in year 2. Factory overheads include apportionment of general factory overheads except to the extent of insurance charges of ₹ 30 lakhs per annum payable on this venture. The company's tax rate is 35%.

Present value factors for four years are as under:

Year	1	2	3	4
Present value factors	0.870	0.756	0.658	0.572

Advise the management on the desirability of installing the machine for processing the waste. All calculations should form part of the answer.

Solution:

Statement of Incremental Profit

(₹ in lakhs)

Years	1	2	3	4
Sales: (A)	322	322	418	418
Material consumption	30	40	85	85
Wages	60	65	85	100
Other expenses	40	45	54	70
Factory overheads (Insurance)	30	30	30	30
Loss of rent	10	10	10	10
Interest	32	24	16	8
Depreciation (as per income tax rules)	50	38	28	21

Total cost: (B)	252	252	308	324
Incremental profit: (C) = (A) – (B)	70	70	110	94
Tax (35% of (C))	24.5	24.5	38.5	32.9

Statement of Incremental Cash Flows

(₹ in lakhs)

Years	0	1	2	3	4
Material stocks	(20)	(35)	-	-	-
Compensation for contract	(30)	-	-	-	-
Contract payment saved	-	50	50	50	50
Tax on contract payment	-	(25)	(25)	(25)	(25)
Incremental profit	-	70	70	110	94
Depreciation added back	-	50	38	28	21
Tax on profits	-	(24.5)	(24.5)	(38.5)	(32.9)
Loan repayment	-	(50)	(50)	(50)	(50)
Profit on sale of machinery (net)	-	-	-	-	5
Total incremental cash flows	(50)	35.5	58.5	74.5	62.1
Present value factor	1.00	0.870	0.756	0.658	0.572
Net present value of cash flows	(50)	30.885	44.226	49.021	35.5212

Net present Value = ₹ 159.6532 – ₹ 50 = ₹ 109.6532 lakhs.

Advice: Since the net present value of cash flows is ₹ 109.6532 lakhs which is positive the management should install the machine for processing the waste.

Notes:

1. Materials stock increase are taken in cash flows.
2. idle-time wages have also been considered.
3. Apportioned factory overheads are not relevant only insurance charges of this project are relevant.
4. Interest calculated at 16% based on 4 equal instalments of loan repayment.
5. Sale of machinery – Net income after deducting removal expenses taken. Tax on capital gains ignored.
6. Saving in contract payment and income tax there on considered in the cash flows.

Illustration 10.

(a) ABC Company Ltd. has been producing a chemical product by using machine Z for the last two years. Now the management of the company is thinking to replace this machine either by X or by Y machine. The following details are furnished to you:

	Z	X	Y
Books value (₹)	1,00,000	-	-
Resale value now (₹)	1,10,000	-	-
Purchase price (₹)	-	1,80,000	2,00,000
Annual fixed costs (including depreciation) (₹)	92,000	1,08,000	1,32,000
Variable running costs (including labour) per unit (₹)	3	1.50	2.50
Production per hour (unit)	8	8	12



You are also provided with the following details:	
Selling price per unit	(₹) 20
Cost of materials per unit	(₹) 10
Annual operating hours	2,000
Working life of each of the three machines (as from now)	5 years
Salvage value of machines Z ₹ 10,000, X ₹ 15,000, Y ₹ 18,000	

The company charges depreciation using straight line method. It is anticipated that an additional cost of ₹ 8,000 per annum would be incurred on special advertising to sell the extra output of machine. Assume tax rate of 40% and cost of capital 10%. The present value of Re. 1 to be received at the end of the year at 10% is as under:

Year	1	2	3	4	5
Present value	0.909	0.826	0.751	0.683	0.621

Required: Using NPV method, you are required to analyse the feasibility of the proposal and make recommendations.

- (b) The Globe Manufacturing Company Ltd. is considering an investment in one of the two mutually exclusive proposals – Projects X and Y, which require cash outlays of ₹ 3,40,000 and ₹ 3,30,000 respectively. The certainty-equivalent (C.E.) approach is used in incorporating risk in capital budgeting decisions. The current yield on government bond is 10% and this be used as the riskless rate. The expected net cash flows and their certainty-equivalents are as follows:

Project X			Project Y	
Year-end	Cash flow	C.E.	Cash flow	C.E.
	₹		₹	
1	1,80,000	0.8	1,80,000	0.9
2	2,00,000	0.7	1,80,000	0.8
3	2,00,000	0.5	2,00,000	0.7

Present value factors of Re. 1 discounted at 10% at the end of year 1, 2 and 3 are .9091, .8264 and .7513 respectively.

Required:

- Which project should be accepted?
- If risk adjusted discount rate method is used, which project would be analysed with a higher rate?

Solution:

- (a) ABC Company Ltd.

Computation of yearly cash inflow

Machine	Z	X	Y
Sales (units)	16,000	16,000	24,000
Selling price per unit (₹)	20	20	20
Sales : (A)	3,20,000	3,20,000	4,80,000
Less: Costs			
Variable running costs	48,000	24,000	60,000
Material cost	1,60,000	1,60,000	2,40,000
Annual fixed cost	92,000	1,08,000	1,32,000
Additional cost (Special advertising)	-	-	8,000

Total costs: (B)	3,00,000	2,92,000	4,40,000
Profit before tax: (A) – (B)	20,000	28,000	40,000
Less: Tax @ 40%	8,000	11,200	16,000
Profit after tax	12,000	16,800	24,000
Add: Depreciation	20,000	33,000	36,400
Cash inflow	32,000	49,800	60,400

Computation of cash inflow in 5th year

Machine	Z	X	Y
Cash in flow	32,000	49,800	60,400
Add: Salvage value of machines	10,000	15,000	18,000
Cash inflow	42,000	64,800	78,400

Computation of Net Present Value

Year	Machine	Z		X		Y	
	Discounting factor	Cash inflow	P.V. of cash inflow	Cash inflow	P.V. of cash inflow	Cash inflow	P.V. of cash inflow
		₹	₹	₹	₹	₹	₹
1	0.909	32,000	29,088	49,800	45,268	60,400	54,904
2	0.826	32,000	26,432	49,800	41,135	60,400	49,890
3	0.751	32,000	24,032	49,800	37,400	60,400	45,360
4	0.683	32,000	21,856	49,800	34,013	60,400	41,253
5	0.621	42,000	26,082	64,800	40,241	78,400	48,686
			1,27,490		1,98,057		2,40,093
Less: Purchase price			1,10,000	1,80,000		2,00,000	
Net present value			17,490	18,057		40,093	

Recommendation:

The net present value is higher in the case of Machine Y. Therefore, it is advisable that the company should replace machine Z with machine Y.

However, as the cost of investment is not the same for all machines, it would be better to base the decision on profitability index which is as under:

$$P.I. = \frac{\text{P.V. of cash inflow}}{\text{P.V. of cash outflow}}$$

$$\text{Machine Z} = \frac{1,27,490}{1,10,000} = 1.159$$

$$\text{Machine X} = \frac{1,98,057}{1,80,000} = 1.10$$

$$\text{Machine Y} = \frac{2,40,093}{2,00,000} = 1.20$$

Since the profitability index of machine Y is the highest therefore machine Z should be replaced by machine Y.

**(b) (i) Statement showing Net Present Value of Project X**

Year-end	Cash flow	C.E.	Adjusted Cash flow	Present value factor at 10%	Total present value
	₹		₹		₹
	(a)	(b)	(c) = (a) x (b)	(d)	(e) = (c) x (d)
1	1,80,000	0.8	1,44,000	0.9091	1,30,910
2	2,00,000	0.7	1,40,000	0.8264	1,15,696
3	2,00,000	0.5	1,00,000	0.7513	75,130
					321,736
Less: Initial investment					3,40,000
Net present value					(18,264)

Statement showing the Net Present Value of Project Y

Year-end	Cash flow	C.E.	Adjusted Cash flow	Present value factor 10%	Total present value
	₹		₹		₹
	(a)	(b)	(c) = (a) x (b)	(d)	(e) = (c) x (d)
1	1,80,000	0.9	1,62,000	0.9091	1,47,274
2	1,80,000	0.8	1,44,000	0.8264	1,19,002
3	2,00,000	0.7	1,40,000	0.7513	1,05,182
					3,71,458
Less: Initial investment					3,30,000
Net present value					41,458

Decision: Since the net present value of project Y is positive, the project Y should be accepted.

- (ii) Since the certainty-equivalent (C.E.) Co-efficient of project X is lower than project Y, the project X is riskier than project Y. Therefore, if risk adjusted discount rate method is used the project X would be analysed with a higher rate.

Illustration 11.

- (a) A firm has an investment proposal, requiring an outlay of ₹ 40,000. The investment proposal is expected to have 2 years' economic life with no salvage value. In year 1, there is a 0.4 probability that cash inflow after tax will be ₹ 25,000 and 0.6 probability that cash inflow after tax will be ₹ 30,000. The probabilities assigned to cash inflows after tax for the year 2 are as follows:

The Cash inflow year 1	₹ 25,000		₹ 30,000	
The Cash inflow year 2		Probability		Probability
	₹ 12,000	0.2	₹ 20,000	0.4
	₹ 16,000	0.3	₹ 25,000	0.5
	₹ 22,000	0.5	₹ 30,000	0.1

The firm uses a 12% discount rate for this type of investment.

Required:

- Construct a decision tree for the proposed investment project.
- What net present value will the project yield if worst outcome is realized? What is the probability of occurrence of this NPV?
- What will be the best and the probability of that occurrence?

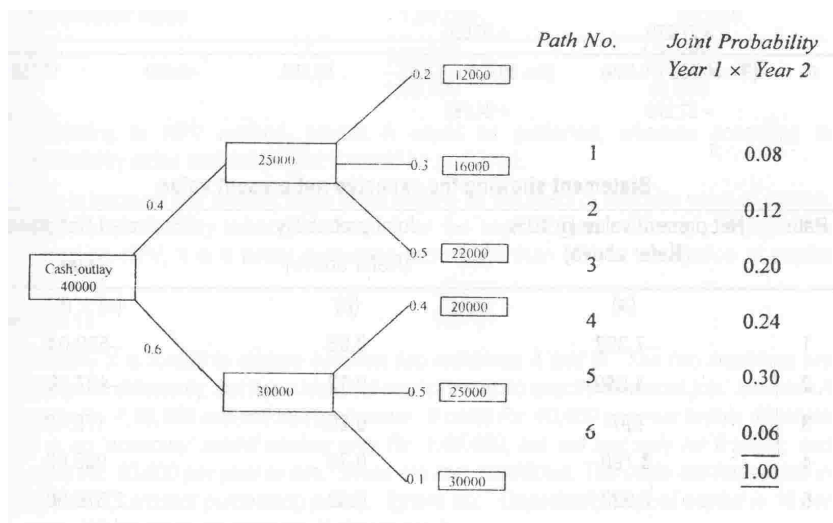
(iv) Will the project be accepted?

(12% Discount factor 1 year 0.8929
 2 year 0.7972)

(b) Do the profitability index and the NPV criterion of evaluating investment proposals lead to the same acceptance – rejection and ranking decisions? In what situations will they give conflicting results?

Solution:

(i)



The decision tree given above shows that there are six possible outcomes each represented by a path. The net present value of each path at 10% discount rate is given below:

Path	(Cash inflow year 1 x discount factor year 1)	(Cash inflow year 2 x discount factor year 2)	Total Cash inflow	Cash outflow	Net present value
	(a)	(b)	(c) = (a) + (b)	(d)	(e) = (c) – (d)
			₹	₹	₹
1	(₹ 25,000 × 0.8929) = 22,323	(₹ 12,000 × 0.7972) = 9,566	31,889	40,000	-8,111
2	(₹ 25,000 × 0.8929) = 22,323	(₹ 16,000 × 0.7972) = 12,755	35,078	40,000	-4,922
3	(₹ 25,000 × 0.8929) = 22,323	(₹ 22,000 × 0.7972) = 17,538	39,861	40,000	-139
4	(₹ 30,000 × 0.8929) = 26,787	(₹ 20,000 × 0.7972) = 15,944	42,731	40,000	2,731
5	(₹ 30,000 × 0.8929) = 26,787	(₹ 25,000 × 0.7972) = 19,930	46,717	40,000	6,717
6	(₹ 30,000 × 0.8929) = 26,787	(₹ 30,000 × 0.7972) = 23,916	50,703	40,000	10,703



Statement showing the expected Net Present Value

Path	Net present value @ 10% (Refer above)	Joint probability (Refer above)	Expected Net present value
	(a)	(b)	(a) × (b)
1	-8,111	0.08	-648.88
2	-4,922	0.12	-590.64
3	-139	0.20	-27.80
4	2,731	0.24	655.44
5	6,717	0.30	2,015.10
6	10,703	0.06	642.18
			2,045.40

- (ii) If the worst outcome is realized the Net present value which the project will yield is ₹ 8,111 (negative). The probability of occurrence of this Net present value is 8%.
- (iii) The best outcome will be path 6 when Net present value is higher i.e. ₹ 10,703 (positive). The probability of occurrence of this Net present value is 6%.
- (iv) Yes, the project will be accepted since the Expected Net present value x probability sum total is positive.
- (b)** In most of the situations the Net present value method (NPV) and Profitability Index (PI) yield same accept or reject decision. In general terms, under PI method a project is acceptable if profitability index value is greater than 1 and rejected if it is less than 1. Under NPV method a project is acceptable if Net present value of a project is positive and rejected if it is negative. Clearly a project offering a profitability index greater than 1 must also offer a net present value which is positive. But a conflict may arise between two methods if a choice between mutually exclusive projects has to be made. Consider the following example:

	Project A	Project B
PV of Cash inflows	2,00,000	1,00,000
Initial cash outflows	1,00,000	40,000
Net present value	1,00,000	60,000
P.I.	$\frac{2,00,000}{1,00,000} = 2$	$\frac{1,00,000}{40,000} = 2.5$

According to NPV method, project A would be preferred, whereas according to profitability index method project B would be preferred. This is because Net present value gives ranking on the basis of absolute value of rupees. Whereas profitability index gives ranking on the basis of ratio. Although PI method is based on NPV, it is a better evaluation techniques than NPV in a situation of capital rationing.

Illustration 12.

- (a) Company X is forced to choose between two machines A and B. The two machines are designed differently, but have identical capacity and do exactly the same job. Machine A costs ₹ 1,50,000 and will last for 3 years. It costs ₹ 40,000 per year to run. Machine B is an 'economy' model costing only ₹ 1,00,000, but will last only for 2 years, and costs ₹ 60,000 per year to run. These are real cash flows. The costs are forecasted in rupees of constant purchasing power. Ignore tax. Opportunity cost of capital is 12 per cent. Which machine company X should buy?
- (b) Company Y is operating an elderly machine that is expected to produce a net cash inflow of ₹ 40,000 in the coming year and ₹ 40,000 next year. Current salvage value is ₹ 80,000 and next

year's value is ₹ 70,000. The machine can be replaced now with a new machine, which costs ₹ 1,50,000, but is much more efficient and will provide a cash inflow of ₹ 80,000 a year for 3 years. Company Y wants to know whether it should replace the equipment now or wait a year with the clear understanding that the new machine is the best of the available alternatives and that it in turn be replaced at the optimal point. Ignore tax. Take opportunity cost of capital as 12 per cent. Advise with reasons.

Solution:**(a) Statement showing the evaluation of two machines**

Machines	A	B
Purchase cost (₹): (i)	1,50,000	1,00,000
Life of machines (years)	3	2
Running cost of machine per year (₹): (ii)	40,000	60,000
Cumulative present value factor for 1-3 years @ 12% (iii)	2.4019	-
Cumulative present value factor for 1-2 years @ 10% (iv)	-	1.6901
Present value of running cost of machines (₹): (v)	96,076	1,01,406
	[(ii) × (iii)]	[(ii) × (iv)]
Cash outflow of machines (₹): (vi) = (i) + (v)	2,46,076	2,01,406
Equivalent present value of annual cash outflow	1,02,451	1,19,168
	[(vi) ÷ (iii)]	[(vi) ÷ (iv)]

Decision: Company X should buy machine A since its equivalent cash outflow is less than machine B.

(b) Statement showing present value of cash inflow of new machine when it replaces elderly machine now

	₹	₹
Cash inflow of a new machine per year		80,000
Cumulative present value for 1-3 years @ 12%		2.4019
Present value of cash inflow for 3 years (₹ 80,000 × 2.4019)		1,92,152
Less: Cash outflow		
Purchase cost of new machine	1,50,000	
Less: Salvage value of old machine	80,000	70,000
N.P.V. of cash inflow for 3 years		1,22,152
Equivalent annual net present value of cash		
Inflow of new machine (₹1,22,152/2.4019)		50,856

Statement showing present value of cash inflow of new machine when it replaces elderly machine next year

		₹
Cash inflow of a new machine per year		80,000
Cumulative present value for 1-3 years @ 12%		2.4019
Present value of cash inflow for 3 years (₹ 80,000 × 2.4019)		1,92,152
	₹	
Less: Cash outflow		



Purchase cost of new machine	1,50,000	
Less: Salvage value of old machine	70,000	80,000
N.P.V. of cash inflow for 3 years		1,12,152
Equivalent annual net present value of cash Inflow (₹1,12,152/2.4019)		46,693

Advise: Since the equivalent annual cash inflow of new machine now and next year is more than cash inflow (₹ 40,000) of an elderly machine the company Y is advised to replace the elderly machine now.

Company Y need not wait for the next year to replace the elderly machine since the equivalent annual cash inflow now is more than the next year's cash inflow.

Illustration 13.

A private university with a current enrolment of 12,000 students is reviewing cost and revenue data for the past academic year. Student tuition is ₹ 3,600 a year. Tuition normally covers 75 per cent of university expenditures. The remaining 25 per cent comes from endowments and contributions. During the last academic year fixed costs amounted to ₹ 300 lakhs. The rest of the costs varied with student enrolment. Cost have been rising more rapidly than tuition or contributions, and the university just broke even last year. A tuition fee increase is being contemplated. The budget committee thinks endowment revenues and contributions will remain constant at last years' level for the next several years.

The fixed costs are expected to increase by ₹ 50 lakhs and the variable costs are expected to increase by 15 per cent. The president of the university tells the budget committee that he expects a new grant of ₹ 50 lakhs in addition to the normal contributions for each of the next 5 years from a large corporation owned by an alumnus of the university. The university has been postponing a number of major capital improvements and building projects.

Required:

- If the grant is received and tuition is raised to ₹ 4,500, how much money would the university have available in the first year for capital improvements and building with student enrolment of 11,400 and the expected cost increases?
- If the grant is received and costs increases as predicted for the coming year, what tuition should the university charge to break-even with its current enrolment of 12,000 students after providing ₹ 40.20 lakhs for capital improvements?

Solution:

Past academic year

	(₹ in lakhs)
Students tuition @ ₹ 3,600 x 12,000 students – (75%)	432
Endowment and contribution – (25%)	144*
Total cost	576*
(*25% of total cost i.e. $\frac{100}{75} \times 432 = ₹ 576$ lakhs)	
Less: Fixed cost	300
Variable cost	276

Hence variable cost per student = $\frac{₹276 \text{ lakhs}}{12,000 \text{ students}} = ₹ 2,300$

*Out of fixed cost of ₹ 300 lakhs, endowment and contribution is of ₹ 144 lakhs.

Statement showing the money which would be available to the university in first year for Capital improvements and Building

			(₹ in lakhs)
(i)	Tuition fee ₹ 4,500 x 11,400 students		513.00
	Add: Endowment and contribution	144.00	
	Grant	50.00	194.00
			707.00
	Less: Variable cost – ₹ 2,300 X 1.15 x 11,400 students	301.53	
	Fixed cost – ₹ 300 lakhs + ₹ 50 lakhs	350.00	651.53
	Balance for Capital improvements and Building		55.47

Statement showing the Tuition fee which University should charge to break-even

(ii)	Variable cost – ₹ 2,300 x 1.15 x 12,000 students	317.40
	Add: Fixed cost ₹ 300 lakhs + ₹ 50 lakhs	350.00
	Capital improvements	40.20
	Total cost	707.60
	Less: Endowment, contribution and grants	194.00
	Balance from tuitions	513.60

Hence, tuition which university should charge from each student.

$$= \frac{\text{₹}513.60 \text{ lakhs}}{12,000 \text{ students}} = \text{₹}4,280 \text{ per student}$$

Illustration 14.

Big Oil is wondering whether to drill for oil in Westchester Country. The prospectus are as follows:

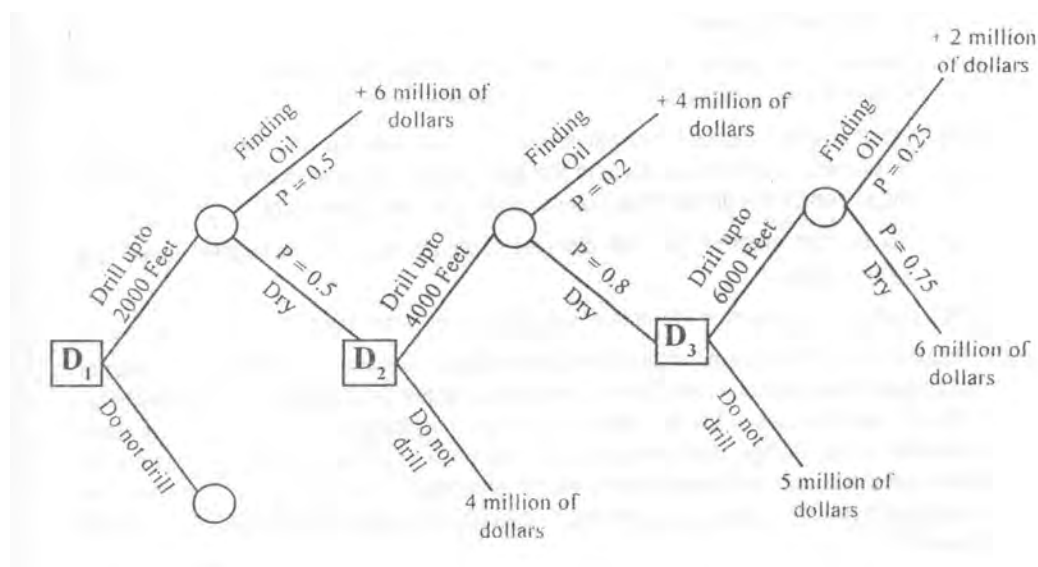
Depth of Well Feet	Total Cost Millions of Dollars	Cumulative Probability of Finding Oil	PV of Oil (If found) Millions of Dollars
2,000	4	0.5	10
4,000	5	0.6	9
6,000	6	0.7	8

Draw a decision tree showing the successive drilling decisions to be made by Big Oil. How deep should it be prepared to drill?



Solution:

The given data is easily represented by the following decision tree diagram:



There are three decision points in the tree indicated by D_1 , D_2 and D_3 .

Using rolling back technique, we shall take the decision at decision point D_3 first and then use it to arrive decision at a decisions point D_2 and then use it to arrive decision at a decision point D_1 .

Statement showing the evaluation of decision at Decision Point D_3

	Decision	Event	Probability	P.V. of Oil (if found) (Millions of dollars)	Expected P.V. of Oil (if found) (Millions of dollars)
1.	Drill upto 6,000 feet	Finding Oil	0.25	+ 2	0.50
		Dry	0.75	- 6	-4.50
		(Refer to working note)			
					-4.00
2.	Do not drill				-5.00

Since the Expected P.V. of Oil (if found) on drilling upto 6,000 feet – 4 millions of dollars is greater than the cost of not drilling – 5 millions of dollars. Therefore, Big Oil should drill upto 6,000 feet.

Statement showing the evaluation of decision at Decision Point D_2

	Decision	Event	Probability	P.V. of Oil (if found) (Millions of dollars)	Expected P.V. of Oil (if found) (Millions of dollars)
1.	Drill upto	Finding Oil	0.2	4	0.8
	4,000 feet	Dry	0.8	-4	-3.2
		(Refer to working note)			
					- 2.4
2.	Do not drill				- 4

Since the Expected P.V. of Oil (if found) on drilling upto 4,000 feet – 2.4 millions of dollars is greater than the cost of not drilling – 4 millions of dollars. Therefore, Big Oil should drill upto 4,000 feet.

Statement showing the evaluation of decision at Decision Point D_1

	Decision	Event	Probability	P.V. of Oil (if found) (Millions of dollars)	Expected P.V. of Oil (if found) (Millions of dollars)
1.	Drill upto 2,000 feet	Finding Oil	0.5	6	3.0
		Dry	0.5	-2.4	-1.2
		(Refer to working note)			
					<u>1.8</u>
2.	Do not drill				NIL

Since the Expected P.V. of Oil (if found) on drilling upto 2,000 feet is 1.8 millions of dollars (positive), Big Oil should drill upto 2,000 feet.

Working Notes:

Let x be the event of not finding oil at 2,000 feet and y be the event of not finding oil at 4,000 feet and z be the event of not finding oil at 6,000 feet.

We know, that,

$$P(x \cap y) = P(x) \times P(y/x)$$

Where, $P(x \cap y)$ is the joint probability of not finding oil at 2,000 feet and 4,000 feet, $P(x)$ is the probability of not finding oil at 2,000 feet and $P(y/x)$ is the probability of not finding oil at 4,000 feet, if the event x has already occurred.

$$\begin{aligned} P(x \cap y) &= 1 - \text{Cumulative probability of finding oil at 4,000 feet} \\ &= 1 - 0.6 = 0.4 \end{aligned}$$

$$\begin{aligned} P(x) &= 1 - \text{Probability of finding oil at 2,000 feet} \\ &= 1 - 0.5 = 0.5 \end{aligned}$$

$$\text{Hence, } P(y/x) = \frac{P(x \cap y)}{P(x)} = \frac{0.4}{0.5} = 0.8$$

Therefore, probability of finding oil between 2,000 feet to 4,000 feet = 1 - 0.8 = 0.2.

$$\text{We know that, } P(x \cap y \cap z) = P(x) \times P(y/x) \times P(z/x \cap y)$$

Where $P(x \cap y \cap z)$ is the joint probability of not finding oil at 2,000 feet, 4,000 feet and 6,000 feet, $P(x)$ and $P(y/x)$ are as explained earlier and $P(z/x \cap y)$ is the probability of not finding oil at 6,000 feet if the event x and y has already occurred.

$$P(x \cap y \cap z) = 1 - \text{Cumulative probability of finding oil at 6,000 feet} = 1 - 0.7 = 0.3$$

$$P(z/x \cap y) = \frac{P(x \cap y \cap z)}{P(x) \times P(y/x)} = \frac{0.3}{0.5 \times 0.8} = \frac{0.3}{0.4} = 0.75$$

Therefore, probability of finding oil between 4,000 feet to 6,000 feet = 1 - 0.75 = 0.25

Illustration 15.

Ze-Te Fashions is a high-fashion women's garments manufacturer. It is planning to introduce a new fashion garment in the market in the forthcoming Diwali season. Four metres of cloth (material) are required to layout the dress pattern. After cutting, some material remains that can be sold as a cut-piece. The left-over material can also be used to manufacture a matching cap and handbag. Ze-Te expects to sell 2,500 dresses, if matching caps and handbags are not provided and 20% more, if matching caps and handbags are made available. The market research indicates that the cap and/or handbag cannot be sold independently, but only as accessories with the dress.



The following combination of sales is expected:	
Complete sets of dress, can and handbag	68%
Dress and Cap only	12%
Dress and handbag only	09%
Dress only	11%
	100%

The material used in the dress costs ₹ 60 per metre. The cost of cutting the dress, if the cap and handbag are not manufactured, is estimated at ₹ 25 a dress and the resulting remnants can be sold for ₹ 5 for each dress cut out.

If the cap and handbag are to be manufactured, it requires a more delicate and skillful cutting and hence cutting cost will increase by ₹ 10 per dress.

The selling prices and the other costs to complete the three items, once they are cut, are as follows:

	Selling price per unit	Other costs per unit
	₹	₹
Dress	400.00	50.00
Cap	29.00	7.00
Handbag	18.00	3.00

Other costs per unit excludes the cost of material and cutting.

You are required to prepare a statement showing:

- Should the company go in for caps and handbags along with dresses? Substantiate your answer.
- What are the non-quantitative factors that could influence the company's decision to manufacture caps and handbags that match the dress?

Solution:

(a) Statement showing profitability of Ze-Te Fashions

	If matching caps and handbags are not provided with dresses	If matching caps and handbags are provided with dresses
Expected Sales/Forecasted Sales (pieces)	2,500	3,000 (Refer to working note 1)
	₹	₹
Sales revenue: (A)	10,00,000	13,11,180
	(2,500 dresses × ₹ 400)	(Refer to working note 2)
Costs		
Materials (i)	5,87,500	7,18,350
(Refer to working note 3)		
Cutting (ii)	62,500	1,01,700
	(2,500 dresses × ₹ 25)	(Refer to working note 4)
Others (iii)	1,25,000	1,73,730
	(2,500 dresses × ₹ 50)	(Refer to working note 5)
Total costs : (B) = [(i) + (ii) + (iii)]	7,75,000	9,93,780
Operating profit : (A) – (B)	2,25,000	3,17,400

Since, the company can earn an additional profit of ₹ 92,400 (₹ 3,17,400 – ₹ 2,25,000) if matching caps and handbags are provided along with dresses. Therefore, the company should go for manufacturing matching caps and handbags and provide them along with dresses.

Working Notes:**1. Expected sales in forthcoming season, if caps and handbags are provided with dresses:**

Complete sets of dress, cap and handbag	(68% of 3,000)	2,040 dresses
Dress and cap only	(12% of 3,000)	360 dresses
Dress and handbag only	(9% of 3,000)	270 dresses
Dress only	(11% of 3,000)	330 dresses
		3,000 dresses

2. Sales revenue of expected sales, if caps and handbags are provided with dresses.

	₹
Complete set of dress, cap and handbag (2,040 dresses × ₹ 447)	9,11,880
Dress and cap only (360 dresses × ₹ 429)	1,54,440
Dress and handbag only (270 dresses × ₹ 418)	1,12,860
Dress only (330 dresses × ₹ 400)	1,32,000
	13,11,180

3. Material

	₹
For 2,500 dresses (4 metres × ₹ 60 per metre – ₹ 5)	5,87,500
for 3,000 dresses [2,670 dresses (4 metres × ₹ 60 per metre) + 330 dresses (4 metres × ₹ 60 per metre – ₹ 5)]	7,18,350

4. Cutting costs for 3,000 dresses

	₹
(2,670 dresses × ₹ 35 + 330 dresses × ₹ 25)	1,01,700

5. Other costs for 3,000 dresses

	₹
Complete set of dress, cap and handbag (2,040 dresses × ₹ 60)	1,22,400
Dress and cap only (360 dresses × ₹ 57)	20,520
Dress and handbag only (270 dresses × ₹ 53)	14,310
Dress only (330 dresses × ₹ 50)	16,500
	1,73,730

(b) Non-quantitative factors that could influence the company's decision to manufacture caps and handbags that match the dress are:

1. Reliability of various estimates of costs, sales and prices.
2. Proper consideration of quality in terms of design, colour and durability.
3. Timing of production and distribution of four combination i.e. complete set of dress, dress and cap, dress and handbags and dress only has been planned suitably in advance.
4. Effect on the production, sale of other product lines of Ze-Te Fashions has to be examined.



Illustration 16.

Complex Ltd., an infrastructure company is evaluating a proposal to build, operate and transfer a section of 20 kms. of road at a project cost of ₹ 400 crores to be financed as follows:

Equity Shares Capital ₹ 100 crores, loans at the rate of interest of 15% p.a. from financial institutions ₹ 300 crores. The Project after completion will be opened to traffic and a toll will be collected for a period of 15 years from the vehicles using the road. The company is also required to maintain the road during the above 15 years and after the completion of that period, it will be handed over to the Highway authorities at zero value. It is estimated that the toll revenue will be ₹ 100 crores per annum and the annual toll collection expenses including maintenance of the roads will amount to 5% of the project cost. The company considers to write off the total cost of the project in 15 years on a straight line basis. For Corporate Income-tax purposes the company is allowed to take depreciation @ 10% on WDV basis. The financial institutions are agreeable for the repayment of the loan in 15 equal annual instalments – consisting of principal and interest.

Calculate Project IRR and Equity IRR. Ignore Corporate taxation. Explain the difference in Project IRR and Equity IRR

Solution:

Computation of Project IRR

Project IRR is computed by using the following equation: $CO_0 = \frac{CF_i}{(1+r)^n}$

Where,

CO_0 = Cash outflow at time zero

CF_i = Net cash inflow at different points of time

N = Life of the project and

R = Rate of discount (IRR)

Now,

CO_0 = ₹ 400 crores

CF_i = ₹ 80 crores p.a. for 15 years

(Refer to working note (i))

Therefore,

₹ 400 crores = ₹ 80 crores / $(1+r)$

The value of IRR of the project:

1. An approximation of IRR is made on the basis of cash flow data. A rough approximation may be made with reference to the payback period. The payback period in the given case is 5 years i.e.

$\left(\frac{₹ 400 \text{ crores}}{₹ 80 \text{ crores}} \right)$. From the PVAF table the closest figures are given in rate 18% (5.092) and the rate 19% (4.876). This means the IRR of the project is expected to be between 18% and 19%.

2. The estimate of IRR cash inflow of the project for both these rates is as follows:

At 18% = ₹ 80 crores × PVAF (18%, 15 years)

= ₹ 80 crores × 5.092

= ₹ 407.36

at 19% = ₹ 80 crores × PVAF (19%, 15 years)

$$= ₹ 80 \text{ crores} \times 4.876$$

$$= ₹ 390.08$$

3. The exact IRR by interpolating between 18% and 19% is worked out as follows:

$$\begin{aligned} \text{IRR} &= 18\% + \frac{₹ 407.36 \text{ crores} - ₹ 400 \text{ crores}}{₹ 407.36 \text{ crores} - ₹ 390.08 \text{ crores}} \times 1\% \\ &= 18\% + \frac{₹ 7.36 \text{ crores}}{₹ 17.28 \text{ crores}} \times 1\% \\ &= 18\% + 0.426\% \\ &= 18.43\% \end{aligned}$$

Therefore, the IRR of the project is 18.43%.

Working Notes:

- (i) Net cash inflow of the project

Cash inflow	₹
Toll revenue	100 crores p.a. for 15 years
Cash outflow	₹
Toll collection expenses including maintenance of the roads	20 crores p.a. for 15 years
(5% of ₹ 400 crores)	
Net cash inflow	80 crores p.a. for 15 years

Note: Since corporate taxes is not payable. The impact of depreciation need not be considered.

Computation of Equity IRR

Equity IRR is computed by using the following equation:

$$\text{Cash inflow at zero date from equity shareholders} = \frac{\text{Cash inflow available for equity shareholders}}{(1 + r)^n}$$

Where,

r = Equity IRR

n = Life of the project

Here, Cash inflow at zero date from equity shareholders = ₹ 100 crores

Cash inflow for equity shareholders = ₹ 28.69 crores p.a.

(Refer to working note)

Therefore:

$$₹ 100 \text{ crores} = \frac{₹ 28.69 \text{ crores}}{(1 + r)^{15}}$$

The value of equity IRR of the project is calculated as follows:

An approximation of IRR is made on the basis of cash flow data. A rough approximation may be made with reference to the payable period. The payback period in the given case is $3.484 \left(\frac{₹ 100 \text{ crores}}{₹ 28.69 \text{ crores}} \right)$.

From the PVAF table at 28% the cumulative discount factor for 1 – 15 years is 3.484. Therefore, the equity IRR of project is 28%.



(ii) Equated annual instalment (i.e. principal + interest) of loan from financial institution:

Amount of loan from financial institution	₹ 300 crores
Rate of interest	15% p.a.
No. of years	15
Cumulative discount factor for 1-15 years	5.847

Hence, equated yearly instalment will be ₹ 300 crores/5.847 i.e. ₹ 51.31 crores.

(iii) Cash inflow available for equity shareholders

Net cash inflow of the project [Refer to working note (i)]	₹ 80.00 crores
Equated yearly instalment of the project [Refer to working note (ii)]	₹ 51.31 crores
Cash inflow available for equity shareholders	₹ 28.69 crores

Difference in Project IRR and Equity IRR:

The project IRR is 18.4% whereas Equity IRR is 28%. This is attributed to the fact that XYZ Ltd. is earning 18.4% on the loan from financial institution but paying only 15%. The difference between the return and cost of funds from financial institution has enhanced equity IRR. The 3.4% (18.4% - 15%) earnings on ₹ 300 crores goes to equity shareholders who have invested ₹ 100 crore i.e.

$$3.4\% \frac{\text{₹ 300 crores}}{\text{₹ 100 crores}} = 10.2\% \text{ is added to the project IRR which equity IRR of } 28\%.$$

Illustration 17.

DD amusement Park charges ₹ 40 each for all rides in the park. Variable costs amount to ₹ 8.00 per ride and fixed costs are ₹ 320 lakhs. Last year's net income was ₹ 64 lakhs on sales of ₹ 480 lakhs. Rising costs have cut sharply into net income for DD for the last 2 year. This year management again expects a cost increase of 25 per cent in variable costs and 10 per cent in fixed costs. To help offset these increases, the management is considering raising the price of a ride to ₹ 50.

Required:

- (1) How many rides did DD sell last year?
- (2) If the price increase is not implemented, what is the expected net income for this year assuming the same volume of activity?
- (3) Compute the price in difference point for the new ride price.
- (4) Compute the Break-even point for this year using the old price and the new price.
- (5) Should management raise the price of a ride, if the price increase will reduce ride volume 10 per cent from the last years' level? In that situation, what will be the expected net income?

Solution:

(1) Rides which DD Amusement Park sell last year

$$\begin{aligned} \text{(No. of rides DD sell last year)} &= \frac{\text{Total Sales of rides last year}}{\text{Charges per ride last year}} \\ &= \frac{\text{₹ 4,80,00,000}}{\text{₹ 40}} \\ &= 12,00,000 \text{ rides} \end{aligned}$$

(2) Expected net income for this year if price increase is not implemented

(assuming the same volume of activity)

	₹
Charges per ride	40
Less: Expected Variable cost per ride (Refer to working note 1)	10
Contribution per ride: (A)	30
No. of rides : (B)	12,00,000
Total expected contribution for all rides: (C) = (A) × (B)	3,60,00,000
Less: Expected fixed costs (Refer to working note (ii))	3,52,00,000
Expected net income	8,00,000

(3) Price indifference point for the new ride price

Price indifference point is a point at which the expected profits remains the same irrespective of sales price and costs.

	₹
New ride price	50
Less: Variable cost	10
Contribution per ride	40
Fixed costs of this year: (A)	3,52,00,000
Net income of last year: (B)	64,00,000
Contribution required: (A) + (B)	4,16,00,000

$$\text{Price - indifference point} = \frac{₹4,16,00,000}{₹40} = 10,40,000 \text{ rides}$$

(4) Break even point for this year using the old price and the new price

$$\text{Break even point} = \frac{\text{Fixed costs}}{\text{Contribution per ride}}$$

$$\begin{aligned} \text{At old price} &= \frac{₹3,52,00,000}{₹40 - ₹10} \\ &= 11,73,334 \text{ rides} \end{aligned}$$

$$\begin{aligned} \text{At new price} &= \frac{₹3,52,00,000}{₹50 - ₹10} \\ &= 8,80,000 \text{ rides} \end{aligned}$$

(5) Expected net income if the price increase will reduce ride volume by 10% from the last year's levels.

	₹
Charges per ride	50
Less: Variable cost	10
Contribution per ride: (A)	40
No. of rides (12,00,000 – 1,20,000): (B)	10,80,000
Total contribution for all rides : (A) × (B)	4,32,00,000
Less: Fixed costs	3,52,00,000
Expected net income	80,00,000

**Justification:**

Since the increase in price of a ride will increase the net income by ₹ 16,00,000 (₹ 80,00,000 – ₹ 64,00,000) the management should raise the price of a ride.

(i) Expected variable cost this year

Variable cost last year	₹ 8.00 per ride
Add: Expected increase this year (25% of ₹ 8.00)	₹ 2.00 per ride
Expected variable cost this year	10.00 per ride

(ii) Expected fixed costs this year

	₹
Fixed costs last year	3,20,00,000
Add: Expected increase this year (10% of ₹ 3,20,00,000)	32,00,000
Expected fixed costs this year	3,52,00,000

Illustration 18.

The total market value of the equity share of a Company is ₹ 80,00,000 and the total value of the debt is ₹ 60,00,000. The treasurer estimate that the beta of the stock is currently 1.5 and that the expected risk premium on the market is 12 per cent. The treasury bill rate is 8 per cent.

Required:

- (1) What is the beta of the Company's existing portfolio of assets?
- (2) Estimate the Company's Cost of capital and the discount rate for an expansion of the company's present business.

Solution:

$$(1) \beta_{\text{company assets}} = \beta_{\text{equity}} \times \frac{V_E}{V_0} + \beta_{\text{debt}} \times \frac{V_D}{V_0}$$

If company's debt capital is riskless than above relationship become:

$$\text{Here } \beta_{\text{equity}} = 1.5 \beta_{\text{assets}} = \beta_{\text{equity}} \frac{V_E}{V_0}$$

$$\beta_{\text{debt}} = 0$$

Note: Since β_{debt} is not given it is assumed that company debt capital is virtually riskless.

$$V_E = ₹ 80 \text{ lakhs.}$$

$$V_D = ₹ 60 \text{ lakhs., } V_0 = ₹ 140 \text{ lakhs.}$$

$$\beta_{\text{company assets}} = 1.5 \times \frac{₹80 \text{ lakhs}}{₹140 \text{ lakhs}} = 0.857$$

$$(2) \text{ Company's cost of capital} = R_f + (\beta_A \times \text{Risk premium})$$

Where R_f = Risk free rate of return

β_A = Beta of company assets

$$\text{Therefore, company's cost of capital} = 8\% + 0.857 \times 12\% = 18.28\%$$

In case of expansion of the company's present business, the same rate of return i.e. 18.28% will be used. However, in case of diversification into new business the risk profile of new business is likely to be different. Therefore, different discount factor has to be worked out for such business.

Illustration 19.

X Ltd. an existing profit-making company, is planning to introduce a new product with a projected life of 8 years. Initial equipment cost will be ₹ 120 lakhs and additional equipment costing ₹ 10 lakhs will be needed at the beginning of third year. At the end of the 8 years, the original equipment will have resale value equivalent to the cost of removal, but the additional equipment would be sold for ₹ 1 lakhs. Working Capital of ₹ 15 lakhs will be needed. The 100% capacity of the plant is of 4,00,000 units per annum, but the production and sales-volume expected are as under:

Year	Capacity in percentage
1	20
2	30
3-5	75
6-8	50

A sale price of ₹ 100 per unit with a profit-volume ratio of 60% is likely to be obtained. Fixed Operating Cash Cost are likely to be ₹ 16 lakhs per annum. In addition to this the advertisement expenditure will have to be incurred as under:

Year	1	2	3-5	6-8
Expenditure in ₹ lakhs each year	30	15	10	4

The company is subject to 40% tax, straight-line method of depreciation, (permissible for tax purposes also) and taking 15% as appropriate after tax Cost of Capital, should the project be accepted?

Solution:**(a) Computation of initial cash outlay**

	(₹ in lakhs)
Equipment Cost (0)	120
Working Capital (0)	15
	135

Calculation of Cash Inflows:

Year	1	2	3-5	6-8
Sales in units	80,000	1,20,000	3,00,000	2,00,000
	₹	₹	₹	₹
Contribution @ ₹ 60 p.u.	48,00,000	72,00,000	1,80,00,000	1,20,00,000
Fixed cost	16,00,000	16,00,000	16,00,000	16,00,000
Advertisement	30,00,000	15,00,000	10,00,000	4,00,000
Depreciation	15,00,000	15,00,000	16,50,000	16,50,000
Profit/(loss)	(13,00,000)	26,00,000	1,37,50,000	83,50,000
Tax @ 40%	Nil	10,40,000	55,00,000	33,40,000
Profit/(loss) after tax	(13,00,000)	15,60,000	82,50,000	50,10,000
Add: Depreciation	15,00,000	15,00,000	16,50,000	16,50,000
Cash Inflow	2,00,000	30,60,000	99,00,000	66,60,000



Computation of PV of CIF

Year	CIF	PV Factor @ 15%	
	₹		₹
1	2,00,000	0.8696	1,73,920
2	30,60,000	0.7561	23,13,666
3	99,00,000	0.6575	65,09,250
4	99,00,000	0.5718	56,60,820
5	99,00,000	0.4972	49,22,280
6	66,60,000	0.4323	28,79,118
7	66,60,000	0.3759	25,03,494
8	66,60,000	0.3269	21,77,154
WC	15,00,000	0.3269	4,90,350
SV	(1,00,000)	0.3269	(32,690)
			2,75,97,362
		PV of COF ₀	1,35,00,000
		Additional Investment = ₹ 10,00,000 × 0.7561	7,56,100
		NPV	1,33,41,262

Recommendation: Accept the project in view of positive NPV.

Illustration 20.

Skylark Airways is planning to acquire a light commercial aircraft for flying class clients at an investment of ₹ 50,00,000. The expected cash flow after tax for the next three years is as follows: (₹)

Year 1		Year 2		Year 3	
CFAT	Probability	CFAT	Probability	CFAT	Probability
14,00,000	0.1	15,00,000	0.1	18,00,000	0.2
18,00,000	0.2	20,00,000	0.3	25,00,000	0.5
25,00,000	0.4	32,00,000	0.4	35,00,000	0.2
40,00,000	0.3	45,00,000	0.2	48,00,000	0.1

The Company wishes to take into consideration all possible risk factors relating to an airline operations. The company wants to know:

- The expected NPV of this venture assuming independent probability distribution with 8 per cent risk free rate of interest.
- The possible deviation in the expected value.
- State the importance of standard deviation of the present value distribution in Capital Budgeting decisions?

Solution:**(i) Expected NPV**

(₹ in lakhs)

Year I			Year II			Year III		
CFAT	P	CF×P	CFAT	P	CF×P	CFAT	P	CF×P
14	0.1	1.4	15	0.1	1.5	18	0.2	3.6
18	0.2	3.6	20	0.3	6.0	25	0.5	12.5
25	0.4	10.0	32	0.4	12.8	35	0.2	7.0
40	0.3	12.0	45	0.2	9	48	0.1	4.8
$\bar{x}$ or $\overline{CF}$		27.0	$\bar{x}$ or $\overline{CF}$		29.3			$\bar{x}$ or $\overline{CF}$ 27.9

NPV	PV factor @ 8%	Total PV
27	0.9259	25.00
29.3	0.8573	25.12
27.9	0.7938	22.15
	PV of cash inflow	72.27
	Less: Cash outflow	50.00
	NPV	22.27

(ii) Possible deviation in the expected value

Year I				
$X - \bar{X}$	$X - \bar{X}$	$(X - \bar{X})^2$	P_1	$(X - \bar{X})^2 P_1$
14 - 27	-13	169	0.1	16.9
18 - 27	-9	81	0.2	16.2
25 - 27	-2	4	0.4	1.6
40 - 27	13	169	0.3	50.7
				85.4

$$\sigma_1 = \sqrt{85.4} = 9.241$$

Year II				
$X - \bar{X}$	$X - \bar{X}$	$(X - \bar{X})^2$	P_2	$(X - \bar{X})^2 \times P_2$
15-29.3	-14.3	204.49	0.1	20.449
20-29.3	-9.3	86.49	0.3	25.947
32-29.3	2.7	7.29	0.4	2.916
45-29.3	15.7	246.49	0.2	49.298
				98.61

$$\sigma_2 = \sqrt{98.61} = 9.930$$

Year III				
$X - \bar{X}$	$X - \bar{X}$	$(X - \bar{X})^2$	P_3	$(X - \bar{X})^2 \times P_3$
18-27.9	-9.9	98.01	0.2	19.602
25-27.9	-2.9	8.41	0.5	4.205
35-27.9	7.1	50.41	0.2	10.082
48-27.9	20.1	404.01	0.1	40.401
				74.29



$$\sigma_3 = \sqrt{74.29} = 8.619$$

Standard deviation about the expected value:

$$\delta = \sqrt{\frac{85.4}{(1.08)^2} + \frac{98.61}{(1.08)^4} + \frac{74.29}{(1.08)^6}} = 13.8749$$

- (iii) Standard deviation is a statistical measure of dispersion; it measures the deviation from a central number i.e. the mean.

In the context of capital budgeting decisions especially where we take up two or more projects giving somewhat similar mean cash flows, by calculating standard deviation in such cases, we can measure in each case the extent of variation. It can then be used to identify which of the projects is least riskier in terms of variability of cash flows.

A project, which has a lower coefficient of variation will be preferred if sizes are heterogeneous.

Besides this, if we assume that probability distribution is approximately normal we are able to calculate the probability of a capital budgeting project generating a net present value less than or more than a specified amount.

Illustration 21.

Jemini Ltd. is in the business of manufacturing bearings. Some more product lines are being planned to be added to the existing system. The machinery required may be bought or may be taken on lease. The cost of machine is ₹ 40,00,000 having a useful life of 5 years with the salvage value of ₹ 8,00,000. The full purchase value of machine can be financed by 20% loan repayable in five equal instalments falling due at the end of each year. Alternatively, the machine can be procured on a 5 years lease, year-end lease rentals being ₹ 12,00,000 per annum. The Company follows the written down value method of depreciation at the rate of 25%. Company's tax rate is 35 per cent and cost of capital is 16 per cent:

- Advise the company which option it should choose – lease or borrow.
- Assess the proposal from the lessor's point of view examining whether leasing the machine is financially viable at 15% cost of capital (Detailed working notes should be given. Calculations can be rounded off to ₹ lakhs).

Solution:

(i) P.V. of Cash outflow under lease option

(in ₹)

Year	Lease Rental after tax	PVIFA @ 13%	Total P.V.
1 – 5	12,00,000 (I – T)	20% (I – T)	
	= 7,80,000	3.517	27,43,260

Cash Outflow under borrowing option

5 equal instalments

$$₹ 40,00,000 \div 2.991 \text{ (PVIFA 20\%)} = 13,37,345$$

Tax Savings

Year	Loan Instalments	On Interest	On Depreciation	Net Cash Outflow	PVIF @13%	Total PV
1	13,37,345	2,80,000	3,50,000	7,07,345	.885	6,26,000
2	13,37,345	2,48,386	2,62,500	8,26,459	.783	6,47,117
3	13,37,345	1,97,249	1,96,875	9,43,221	.693	6,53,652
4	13,37,345	1,43,085	1,47,656	10,46,604	.613	6,41,568
5	13,37,345	78,087	1,10,742	11,48,516	.543	6,23,644
Total PV						31,91,981
Less: PV Salvage value adjusted for Tax savings on loss of sale of machinery (₹ 8,00,000 × .543 = ₹ 4,34,400) + (₹ 28,359) (See Working Note on Depreciation) 9,49,219 – 8,00,000 = 1,49,219 × .35 × .543 = 28,359						(4,62,759)
Total present value of cash outflow						27,29,222

Decision: PV of cash outflow of lease option is greater than borrow option and hence borrow option is recommended.

Working Notes:**1. Debt and Interest Payments**

Year	Loan Instalments	Loan at the beginning of the year	Interest	Principal	Balance at the end of year
1	13,37,345	40,00,000	8,00,000	5,37,345	34,62,655
2	13,37,345	34,62,655	6,92,531	6,44,814	28,17,841
3	13,37,345	28,17,841	5,63,568	7,73,777	20,44,064
4	13,37,345	20,44,064	4,08,813	9,28,532	11,15,532
5	13,37,345	11,15,532	2,23,106	11,14,239	Nil

2. Calculation of Depreciation

Year		Depreciation
1	40,00,000 × .25	10,00,000
2	30,00,000 × .25	7,50,000
3	22,50,000 × .25	5,62,500
4	16,87,500 × .25	4,21,875
5	12,65,625 × .25	3,16,406

W.D.V. of machine = 12,65,625 – 3,16,406 = 9,49,219.

(ii) Proposal from the Lessor's point of view**Lessor's Cash Flow**

	1	2	3	4	5
Lease Rentals	12,00,000	12,00,000	12,00,000	12,00,000	12,00,000
Less: Dep.	10,00,000	7,50,000	5,62,500	4,21,875	3,16,406
EBT	2,00,000	4,50,000	6,37,500	7,78,125	8,83,594
Less: Tax @ 35%	70,000	1,57,500	2,23,125	2,72,344	3,09,258



EAT	1,30,000	2,92,500	4,14,375	5,05,781	5,74,336
CFAT	11,30,000	10,42,500	9,76,875	9,27,656	8,90,742
PV factor @ 15%	0.8696	0.7561	0.6575	0.5717	0.4972
PV	9,82,648	7,88,234	6,42,295	5,30,341	4,43,144

Total P.V. = 33,86,662

Add: Tax Saving on sale of asset = 25,967 (1,49,219 x 0.35 x 0.4972)

Total PV of cash inflow 34,12,629

less : Cost of Machine 40,00,000

NPV (5,87,371)

Decision: Lease rate is not financially viable. Hence, not recommended.

Illustration 22.

- (a) Cyber Company is considering two mutually exclusive projects. Investment outlay of both the projects is ₹ 5,00,000 and each is expected to have a life of 5 years. Under three possible situations their annual cash flows and probabilities are as under:

Situation	Probabilities	Cash Flow	
		Project	Project
		A	B
Good	0.3	6,00,000	5,00,000
Normal	0.4	4,00,000	4,00,000
Worse	0.3	2,00,000	3,00,000

The cost of capital is 9 per cent, which project should be accepted? Explain with workings.

- (b) A company is considering Projects X and Y with following information:

Project	Expected NPV (₹)	Standard deviation
X	1,06,000	75,000
Y	2,40,000	1,35,000

- Which project will you recommend based on the above data?
- Explain whether your opinion will change, if you use coefficient of variation as a measure of risk.
- Which measure is more appropriate in this situation and why?

Solution:

(a) Project A

Expected Net Cash flow (ENCF)

$$0.3 (6,00,000) + 0.4 (4,00,000) + 0.3 (2,00,000) = 4,00,000$$

$$\sigma^2 = 0.3 (6,00,000 - 4,00,000)^2 + 0.4 (4,00,000 - 4,00,000)^2 + 0.3 (2,00,000 - 4,00,000)^2$$

$$\sigma = \sqrt{24,00,00,00,000}$$

$$\sigma = 1,54,919.33$$

$$\text{ENPV} = 4,00,000 \times 4.100 = 16,40,000$$

$$\text{NPV} = 16,40,000 - 5,00,000 = 11,40,000$$

Project B

$$\text{ENCF} = 0.3 (5,00,000) + 0.4 (4,00,000) + 0.3 (3,00,000) = 4,00,000$$

$$\sigma^2 = 0.3 (5,00,000 - 4,00,000)^2 + 0.4 (4,00,000 - 4,00,000)^2 + 0.3 (3,00,000 - 4,00,000)^2$$

$$\sigma = \sqrt{6,00,00,00,000}$$

$$\sigma = 77,459.66$$

$$\text{ENPV} = 4,00,000 \times 4.100 = 16,40,000$$

$$\text{NPV} = 16,40,000 - 5,00,000 = 11,40,000$$

Recommendation:

NPV in both projects being the same, the project should be decided on the basis of standard deviation and hence project 'B' should be accepted having lower standard deviation, means less risky.

- (b) (i)** On the basis of standard deviation project X be chosen because it is less risky than Project Y having higher standard deviation.

$$\text{(ii)} \quad \text{CV}_x = \frac{\text{SD}}{\text{ENPV}} = \frac{75,000}{1,06,000} = .71$$

$$\text{CV}_y = \frac{1,35,000}{2,40,000} = .5626$$

On the basis of Co-efficient of Variation (C.V.) Project X appears to be more risky and Y should be accepted.

- (iii)** However, the NPV method in such conflicting situation is best because the NPV method is in compatibility of the objective of wealth maximisation in terms of time value.

Illustration 23.

Armada Leasing Company is considering a proposal to lease out a school bus. The bus can be purchased for ₹ 8,00,000 and, in turn, be leased out at ₹ 2,00,000 per year for 8 years with payments occurring at the end of each year:

- (i) Estimate the internal rate of return for the company assuming tax is ignored.
- (ii) What should be the yearly lease payment charged by the company in order to earn 20 per cent annual compounded rate of return before expenses and taxes?
- (iii) Calculate the annual lease rent to be charged so as to amount to 20% after tax annual compound rate of return, based on the following assumptions:
 - (i) Tax rate is 40%;
 - (ii) Straight line depreciation;
 - (iii) Annual expenses of ₹ 50,000; and
 - (iv) Resale value ₹ 1,00,000 after the turn.

Solution:

$$\text{(i)} \quad \text{Payback period} = \frac{8,00,000}{2,00,000} = 4.00$$

PV factor closest to 4.00 in 8 years is 4.078 at 18%



Thus IRR = 18%

Note: We may also arrive at the answer of 18.63% instead of 18% if exact calculation are made as follows:-

PV factor in 8 years at 19% is 3.9544

Interpolating for 4.00

$$\text{IRR} = 18\% \frac{4.0776 - 4.000}{4.0776 - 3.9544} = 18.63\%$$

- (ii) Desired lease rent to earn 20% IRR before expenses and taxes:

$$\text{Lease Rent} = \frac{8,00,000}{3.837} = \frac{8,00,000}{\text{PVIFA 8years, 20\%}} = ₹ 2,08,496 \text{ p.a.}$$

- (iii) Revised lease rental on school bus to earn 20% return based on the given conditions.

PV factor $[(X - E - D) (1 - T) + D] + (\text{PV factor} \times \text{S.V.}) = \text{Initial investment}$

$$3.837 [(x - 50,000 - 1,00,000) (1 - 0.4) + 1,00,000] + (0.233 \times 1,00,000) = 8,00,000$$

$$3.837 [(x - 1,50,000) 0.6] + 1,00,000 + 23,300 = 8,00,000$$

$$3.837 [0.6x - 90,000] + 1,00,000 + 23,300 = 8,00,000$$

$$3.837 [0.6x + 10,000] + 23,300 = 8,00,000$$

$$2.3022x + 38,370 + 23,300 = 8,00,000$$

$$2.3022x = 8,00,000 - 38,370 - 23,300$$

$$2.3022x = 7,38,330$$

$$X = 3,20,706$$

This may be confirmed as lease rental 3,20,706

Less: Expenses + Depreciation 1,50,000

EBT 1,70,706

Less tax 40% 68,282

PAT 1,02,424

Add: Depreciation 1,00,000

CFAT 2,02,424

$$\frac{\text{Co-PV of SV}}{\text{CFAT}} = \frac{8,00,000 - 23,300}{2,02,424} = 3.837 \text{ or } 20\%$$

Illustration 24.

The Textile Manufacturing Company Ltd., is considering one of two mutually exclusive proposals, Projects M and N, which require cash outlays of ₹ 8,40,000 and ₹ 8,75,000 respectively. The certainty-equivalent (C.E) approach is used in incorporating risk in capital budgeting decisions. The current yield on government bonds is 7% and this is used as the risk free rate. The expected net cash flows and their certainty equivalents are as follows:

Project M			Project N	
Year-end	Cash Flow ₹	C.E.	Cash Flow ₹	C.E.
1	4,50,000	0.8	4,50,000	0.9
2	5,00,000	0.7	4,50,000	0.8
3	5,00,000	0.5	5,00,000	0.7

Present value factors of ₹ 1 discounted at 7% at the end of year 1, 2 and 3 are 0.9346, 0.8734 and 0.8163 respectively. **Which the project should be accepted?**

Solution:

Statement Showing the Net Present Value of Project M

Year end	Cash Flow (₹) (a)	C.E. (b)	Adjusted Cash flow (₹) (c) = (a) × (b)	Present value factor at 7% (d)	Total Present value (₹) (e) = (c) × (d)
1	4,50,000	0.8	3,60,000	0.9346	3,36,456
2	5,00,000	0.7	3,50,000	0.8734	3,05,690
3	5,00,000	0.5	2,50,000	0.8163	2,04,075
					8,46,221
Less: Initial Investment					8,40,000
Net Present Value					6,221

Statement Showing the Net Present Value of Project N

Year end	Cash Flow (₹) (a)	C.E. (b)	Adjusted Cash flow (₹) (c) = (a) × (b)	Present value factor (d)	Total Present value (₹) (e) = (c) × (d)
1	4,50,000	0.9	4,05,000	0.9346	3,78,513
2	4,50,000	0.8	3,60,000	0.8734	3,14,424
3	5,00,000	0.7	3,50,000	0.8163	2,85,705
					9,78,642
Less: Initial Investment					8,75,000
Net Present Value					1,03,642

Decision: Since the net present value of Project N is higher, so the project N should be accepted.

Illustration 25.

A & Co. is contemplating whether to replace an existing machine or to spend money on overhauling it. A & Co. currently pays no taxes. The replacement machine costs ₹ 1,00,000 now and requires maintenance of ₹ 10,000 at the end of every year for eight years. At the end of eight years it would have a salvage value of ₹ 20,000 and would be sold. The existing machine requires increasing amounts of maintenance each year and its salvage value falls each year as follows:

Year	Maintenance (₹)	Salvage (₹)
Present	0	40,000
1	10,000	25,000
2	20,000	15,000
3	30,000	10,000
4	40,000	0



The opportunity cost of capital for A & Co. is 15%. When should the company replace the machine?

(Notes: Present value of an annuity of ₹ 1 per period for 8 years at interest rate of 15% : 4.4873; present value of ₹ 1 to be received after 8 years at interest rate of 15% : 0.3269).

Solution:

A & Co.

Equivalent cost of (EAC) of new machine

	₹
(i) Cost of new machine now	1,00,000
Add: P.V. of annual repairs @ ₹ 10,000 per annum for 8 years ($₹ 10,000 \times 4.4873$)	44,873
	1,44,873
Less: P.V. of salvage value at the end of 8 years ($₹ 20,000 \times 0.3269$)	6,538
	1,38,335
Equivalent annual cost (EAC) ($₹ 1,38,335 / 4.4873$)	30,828

Equivalent Cost (EAC) of keeping the machine

Present value	I Year	II Year	III Year	IV Year
(P.V)	(₹)	(₹)	(₹)	(₹)
Value Present	40,000	25,000	15,000	10,000
Add: P.V of annual maintenance (Annual Maintenance/1.15)	8,696	17,391	26,087	34,783
Total	48,696	42,391	41,087	44,783
Less: P.V. of salvage value at the end of the year (P.V./1.15)	21,739	13,043	8,696	Nil
	26,957	29,348	32,391	44,783
	1.15	1.15	1.15	1.15
Equivalent Annual Cost (EAC)	31,000	33,750	37,250	51,500

Advice: The company should replace the old machine immediately because the Equivalent Annual Cost (EAC) of the new machine at ₹ 30,828 is lower than the cost of using the existing machine in first year, second year, third year and fourth year.

Illustration 26.

A firm has an investment proposal, requiring an outlay of ₹ 80,000. The investment proposal is expected to have two years economic life with no salvage value. In year 1, there is a 0.4 probability that cash inflow after tax will be ₹ 50,000 and 0.6 probability that cash inflow after tax will be ₹ 60,000. The probability assigned to cash inflow after tax for the year 2 are as follows:

The cash inflow year 1	₹ 50,000	₹ 60,000
The cash inflow year 2	Probability	Probability
	₹ 24,000 0.2	₹ 40,000 0.4
	₹ 32,000 0.3	₹ 50,000 0.5
	₹ 44,000 0.5	₹ 60,000 0.1

The firm uses a 8% discount rate for this type of investment.

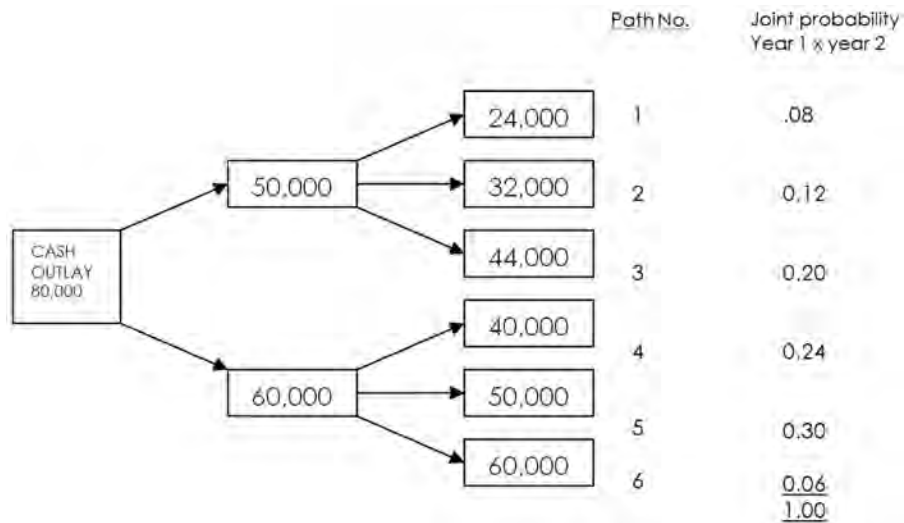
Required:

- Construct a decision tree for the proposed investment project and calculate the expected net present value (NPV).
- What net present value will the project yield, if worst outcome is realized? What is the probability of occurrence of this NPV?
- What will be the best outcome and the probability of that occurrence?
- Will the project be accepted?

(Note: 8% discount factor 1 year 0.9259; 2 year 0.8573)

Solution:

- The decision tree diagram is presented in the chart, identifying various paths and outcomes, and the computation of various paths/outcomes and NPV of each path are presented in the following tables:



The Net Present Value (NPV) of each path at 8% discount rate is given below:

Path	Year 1 Cash Flows (₹)	Year 2 Cash Flows (₹)	Total Cash Inflows (PV) (₹)	Cash Inflows (₹)	NPV (₹)
1	$50,000 \times .9259 = 46,295$	$24,000 \times .8573 = 20,575$	66,870	80,000	(-) 13,130
2	46,295	$32,000 \times .8573 = 27,434$	73,729	80,000	(-) 6,271
3	46,295	$44,000 \times .8573 = 37,721$	84,016	80,000	4,016
4	$60,000 \times .9259 = 55,554$	$40,000 \times .8573 = 34,292$	89,846	80,000	9,846
5	55,554	$50,000 \times .8573 = 42,865$	98,419	80,000	18,419
6	55,554	$60,000 \times .8573 = 51,438$	1,06,992	80,000	26,992

Statement showing Expected Net Present Value

z	NPV(₹)	Joint Probability	Expected NPV
1	(-) 13,130	0.08	-1,050.40
2	(-) 6,271	0.12	-752.52
3	4,016	0.20	803.20
4	9,846	0.24	2,363.04
5	18,419	0.30	5,525.70



6	26,992	0.06	1,619.52
			8,508.54

Conclusions:

- (ii) If the worst outcome is realized the project will yield NPV of – ₹ 13,130. The probability of occurrence of this NPV is 8% and a loss of ₹ 1,050.40 (path 1).
- (iii) The best outcome will be path 5 when the NPV is at ₹ 18,419. The probability of occurrence of this NPV is 30% and a expected profit of ₹ 5,525.70.
- (iv) The project should be accepted because the expected NPV is positive at ₹ 8,508.54 based on joint probability.

Illustration 27.

Your company is considering to acquire an additional computer to supplement its time-share computer services to its clients. It has two options:

- (i) To purchase the computer for ₹ 22 lakhs.
- (ii) To lease the computer for three years from a leasing company for ₹ 5 lakhs as annual lease rent plus 10% of gross time-share service revenue. The agreement also requires an additional payment of ₹ 6 lakhs at the end of the third year. Lease rents are payable at the year-end, and the computer reverts to the lessor after the contract period.

The company estimates that the computer under review will be worth ₹ 10 lakhs at the end of third year.

Forecast Revenues are:

Year	1	2	3
Amount (₹ in lakhs)	22.5	25	27.5

Annual operating costs excluding depreciation/lease rent of computer are estimated at ₹ 9 lakhs with an additional ₹ 1 lakh for start up and training costs at the beginning of the first year. These costs are to be borne by the lessee. Your company will borrow at 16% interest to finance the acquisition of the computer. Repayments are to be made according to the following schedule:

Year end	1	2	3
Principal (₹'000)	500	850	850
Interest (₹'000)	352	272	136

The company uses straight line method (SLM) to depreciate its assets and pays 50% tax on its income. The management approaches you to advice. Which alternative would be recommended and why?

Note: The PV factor at 8% and 16% rates of discount are:

Year	1	2	3
8%	0.926	0.857	0.794
16%	0.862	0.743	0.641

Solution:

Working Notes:

- (a) Depreciation: ₹ 22,00,000 – 10,00,000/3 = ₹ 4,00,000 p.a.
- (b) Effective rate of interest after tax shield: $0.16 \times (1 - 0.50) = 0.08$ or 8%.

- (c) Operating and training costs are common in both alternatives hence not considered while calculating NPV of cash flows.

Calculation of NPV

1. Alternative I: Purchase of Computer

Particulars	Year 1	Year 2	Year 3
	₹	₹	₹
Instalment Payment			
Principal	5,00,000	8,50,000	8,50,000
Interest	3,52,000	2,72,000	1,36,000
Total (A)	8,52,000	11,22,000	9,86,000
Tax shield @ 50%:			
Interest payment	1,76,000	1,36,000	68,000
Depreciation	2,00,000	2,00,000	2,00,000
Total (B)	3,76,000	3,36,000	2,68,000
Net Cash outflows (A – B)	4,76,000	7,86,000	7,18,000
PV factor at 8%	0.926	0.857	0.794
PV of Cash outflows	4,40,776	6,73,602	5,70,092
Total PV of Cash outflows:			16,84,470
Less: PV of salvage value (₹ 10 lakhs × 0.794)			7,94,000
Net PV of cash outflows			8,90,470

2. Alternative II: Lease of the Computer

Particulars	Year 1	Year 2	Year 3
	₹	₹	₹
Lease rent	5,00,000	5,00,000	5,00,000
10% of gross revenue	2,25,000	2,50,000	2,75,000
Lump sum payment	-	-	6,00,000
Total Payment	7,25,000	7,50,000	13,75,000
Less: Tax shield @ 50%	3,62,500	3,75,000	6,87,500
Net Cash outflows	3,62,500	3,75,000	6,87,500
PV of Cash outflows @ 8%	3,35,675	3,21,375	5,45,875
Total PV of cash outflows			12,02,925

Recommendation:

Since the Present Value (PV) of net cash outflow of Alternative I is lower, the company should purchase the computer.

Illustration 28.

Fair finance, a leasing company, has been approached by a prospective customer intending to acquire a machine whose Cash Down price is ₹ 3 crores. The customer, in order to leverage his tax position, has requested a quote for a three year lease with rentals payable at the end of each year but in a diminishing manner such that they are in the ratio of 3: 2 : 1. Depreciation can be assumed to be on straight line basis and Fair Finance's marginal tax rate is 35%. The target rate of return for Fair Finance on the transaction is 12%.

**Required:**

Calculate the lease rents to be quoted for the lease for three years.

Solution:**Capital sum to be placed under Lease**

₹ in lakhs

Cash Down price of machine 300.00

Less: Present value of depreciation

Tax Shield

$$100 \times .35 \times \frac{1}{(1.12)} \quad 31.25$$

$$100 \times .35 \times \frac{1}{(1.12)^2} \quad 27.90$$

$$100 \times .35 \times \frac{1}{(1.12)^3} \quad 24.91 \quad \underline{84.06}$$

215.94

If the normal annual lease rent per annum is x, then cash flow will be:

Year	Post-tax cash flow	P.V. of post-tax cash flow
1	$3x \times (1 - .35) = 1.95x$	$1.95 \times (1/1.12) = 1.7411x$
2	$2x \times (1 - .35) = 1.3x$	$1.30 \times [(1/(1.12)^2)] = 1.0364x$
3	$x \times (1 - .35) = 0.65x$	$0.65 \times [1/(1.12)^3] = 0.4626x$
		<u>$= 3.2401x$</u>

Therefore $3.2401x = 215.94$ or $x = ₹ 66.6409$ lakhs

Year-wise lease rentals:

₹ in lakhs

Year 1	3×66.6409 lakhs	$= 199.9227$
2	2×66.6409 lakhs	$= 133.2818$
3	1×66.6409 lakhs	$= 66.6409$

Illustration 29.

ABC Ltd. is considering a proposal to acquire a machine costing ₹ 1,10,000 payable ₹ 10,000 down and balance payable in 10 annual equal instalments at the end of each year inclusive of interest chargeable at 15%. Another option before it is to acquire the asset on a lease rental of ₹ 15,000 per annum payable at the end of each year for 10 years. The following information is also available.

- Terminal Scrap value of ₹ 20,000 is realizable, if the asset is purchased.
- The company provides 10% depreciation on straight line method on the original cost.
- Income tax rate is 40%.

You are required to compute the analyse cash flows and to advise as to which option is better.

Solution:

Option I : To buy the asset:

In this option the firm has to pay ₹ 10,000 down and the balance ₹ 1,00,000 together with interest @ 15% is payable in 10 annual equal instalments. The instalment amount may be calculated by dividing ₹ 1,00,000 by the PVAF for 10 years at 15% i.e.

Annual repayment = ₹ 1,00,000/5.0188 = ₹ 19,925

The cash flows of the borrowing and purchase option may be computed as follows:

Year	Instalment	Interest	Repayment	Balance
	₹	₹	₹	₹
1	19,925	15,000	4,925	95,075
2	19,925	14,261	5,664	89,411
3	19,925	13,412	6,513	82,898
4	19,925	12,435	7,490	75,408
5	19,925	11,311	8,614	66,794
6	19,925	10,019	9,906	56,888
7	19,925	8,533	11,392	45,496
8	19,925	6,824	13,101	32,395
9	19,925	4,859	15,066	17,329
10	19,925	2,596*	17,329	-

* Difference between the outstanding balance and the last instalment (i.e. ₹ 19,925 – ₹ 17,329 = ₹ 2,596)

Year	Instalment	Interest	Depreciation	Tax Shield 40% (2 + 3)	Net CF (1-4)	PVF	PV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	₹	₹	₹	₹	₹		₹
0	10,000	-	-	-	-	1.000	10,000
1	19,925	15,000	11,000	10,400	9,525	0.870	8,287
2	19,925	14,261	11,000	10,104	9,821	0.756	7,425
3	19,925	13,412	11,000	9,765	10,160	0.658	6,685
4	19,925	12,435	11,000	9,374	10,551	0.572	6,035
5	19,925	11,311	11,000	8,924	11,001	0.497	5,467
6	19,925	10,019	11,000	8,408	11,517	0.432	4,975
7	19,925	8,533	11,000	7,813	12,112	0.376	4,554
8	19,925	6,824	11,000	7,130	12,795	0.327	4,183
9	19,925	4,859	11,000	6,344	13,581	0.284	3,857
10	19,925	2,596	11,000	5,438	14,487	0.247	3,578
	Present value of total outflows						-65,046
11	Salvage value (after tax)		12,000	-	-	0.247	+2,964
	Net present value of outflows						-62,082



Note: - It may be noted that (i) depreciation of ₹ 11,000 has been provided for all the 10 years. This is 10% of the original cost of ₹ 1,10,000. (ii) The asset is fully depreciated during its life of 10 years, therefore, the book value at the end of 10th year would be zero. As the asset is having a salvage value of ₹ 20,000, this would be capital gain and presuming it to be taxable at the normal rate of 40%, the net cash inflow on account of salvage value would be ₹ 12,000 only. This is further discounted to find out the present value of this inflow.

Option II – Evaluation of Lease Option:

In case the asset is acquired on lease, there is a lease rent of ₹ 15,000 payable at the end of next 10 years. This lease rental is tax deductible, therefore, the net cash outflow would be only ₹ 9,000 (after tax). The PVAF for 10 years @ 15% is 5.0188. So, the present value of annuity of ₹ 9,000 is Present value of annuity of outflow = ₹ 9,000 × 5.0188 = ₹ 45,169.

Advice:

If the firm opts to buy the asset, the present value of outflow comes to ₹ 62,082; and in case of lease option, the present value of outflows comes to ₹ 45,164. Hence, the firm should opt for the lease option. In this way, the firm will be able to reduce its costs by ₹ 16,913 [i.e. ₹ 62,082 – ₹ 45,169]. This may also be referred to as Net Benefit of Leasing.

Illustration 30.

A firm has projected the following cash flows from a project under evaluation:

Year	₹ lakhs
0	(70)
1	30
2	40
3	30

The above cash flows have been made at expected prices after recognizing inflation. The firm's cost of capital is 12%. The expected annual rate of inflation is 5%. Show how the viability of the project is to be evaluated.

Solution:

It is stated that the cash flows have been adjusted for inflation; hence they are "nominal". The cost of capital or discount rate is "real". In order to be compatible, the cash flows should be converted into "real flow". This is done as below:

Year	Nominal cash flows	Adjusted Inflation* factor	Real cash flows	PVF @ 12%	PV of cash flows
0	(70)	-	(70)	1.000	(70)
1	30	0.952	28.56	0.8929	25.50
2	40	0.907	36.28	0.7972	28.92
3	30	0.864	25.92	0.7117	18.45
				Total	72.87
				NPV (+)	2.87

* $1/1.05$; $1/(1.05)^2$; $1/(1.05)^3$;

with positive NPV, the project is financially viable.

Alternatively, instead of converting cash flows into real terms, the discount rate can be converted into nominal rate. Result will be the same.

An alternative solution is presented herewith

Alternative solution:

Year	Nominal cash flows	PVF @ 12% adjusted by the inflation factor i.e. 5%*	PV of cash flows
0	(70)	1.000	(70)
1	30	0.8504	25.512
2	40	0.7231	28.924
3	30	0.6148	18.444
		Cash inflow	72.88
		Net present value	2.88

$$* \frac{0.8929}{1.05} = 0.8504, \frac{0.7972}{1.1025} = 0.7231, \frac{0.7117}{0.1576} = 0.6148$$

with positive NPV, the project is financially viable.



10.2 INVESTMENT IN ADVANCED TECHNOLOGICAL ENVIRONMENT

10.2.1 Financial Forecasting

Financial Forecasting describes the process by which firms think about and prepare for the future. The forecasting process provides the means for a firm to express its goals and priorities and to ensure that they are internally consistent. It also assists the firm in identifying the asset requirements and needs for external financing.

For example, the principal driver of the forecasting process is generally the sales forecast. Since most Balance Sheet and Income Statement accounts are related to sales, the forecasting process can help the firm assess the increase in current and fixed assets which will be needed to support the forecasted sales level. Similarly, the external financing which will be needed to pay for the forecasted increase in assets can be determined.

Firms also have goals related to capital structure (the mix of debt and equity used to finance the firm's assets), dividend policy, and working capital management. Therefore, the forecasting process allows the firm to determine if its forecasted sales growth rate is consistent with its desired capital Structure and dividend policy.

The forecasting approach presented in this section is the Percentage of Sales method. It forecasts the Balance Sheet and Income Statement by assuming that most accounts maintain a fixed proportion of Sales. This approach, although fairly simple, illustrates many of the issues related to forecasting and can readily be extended to allow for a more flexible technique, such as forecasting items on an individual basis.

Percentage of Sales Method

The Percentage of Sales Method is a financial forecasting approach which is based on the premise that most Balance Sheet and Income Statement Accounts vary with sales. Therefore, the key driver of this method is the Sales Forecast and based upon this, Pro-Forma Financial Statements (i.e., forecasted) can be constructed and the firms needs for external financing can be identified. The calculations illustrated on this page will refer to the Balance Sheet and Income Statement which follow. The forecasted Sales growth rate in this example is 25%:

Balance Sheet (₹ in Millions)				Income Statement (₹ in Millions)	
Assets	2012	Liabilities and Owners' Equity	2012		2012
Current Assets		Current Liabilities		Sales	1,200
Cash	200	Accounts Payable	400	Cost of Goods Sold	900
Accounts Receivable	400	Notes Payable	400	Taxable Income	300
Inventory	600	Total Current Liabilities	800	Taxes	90
Total Current Assets	1,200	Long-Term Liabilities		Net Income	210
		Long-Term Debt	500	Dividends	70
Fixed assets		Total Long-Term Liabilities	500	Addition to retained Earnings	140
Net Fixed Assets	800	Owners' Equity			
		Equity Shares (₹1 par)	300		
		Retained Earnings	400		
		Total Owners' Equity	700		
Total Assets	2,000	Total Liability And Owners' Equity	2,000		

Percentages of Sales

The first step is to express the Balance Sheet and Income Statement accounts which vary directly with sales as percentages of sales. This is done by dividing the balance for these accounts for the current year (2012) by sales revenue for the current year.

The Balance Sheet accounts which generally vary closely with Sales are Cash, Accounts Receivable, Inventory, and Accounts Payable. Fixed Assets are also often tied closely to Sales, unless there is excess capacity. (The issue of excess capacity will be addressed in External Financing Needed section.) For this example, we will assume that Fixed Assets are currently at full capacity and, thus, will vary directly with sales.

Retained Earnings on the Balance Sheet represent the cumulative total of the firm's earnings which have been reinvested in the firm. Thus, the change in this account is linked to sales; however, the link comes from relationship between Sales growth and Earnings.

The Notes Payable, Long-Term Debt, and Equity Share Accounts do not vary automatically with Sales. The changes in these accounts depend upon how the firm chooses to raise the funds needed to support the forecasted growth in Sales.

On the Income Statement, Costs are expressed as a percentage of Sales. Since we are assuming that all costs remain at a fixed percentage of Sales, Net Income can be expressed as a percentage of Sales. This indicates the Profit Margin.

Taxes are expressed as a percentage of Taxable Income (to determine the tax rate). Dividends and Addition to Retained Earnings are expressed as a percentage of Net Income to determine the Payout and Retention Ratios respectively.

Percentage of Sales Calculations	
The examples in this box illustrate the calculations which were used to determine the percentages provided in the following Balance Sheet and Income Statement.	
Cash	Cash/Sales = ₹200/₹1200 = 0.1667 = 16.67%
Inventory	Inventory/Sales = ₹600/₹1200 = 0.5 = 50%
Accounts Payable	(Accounts Payable)/Sales = ₹400/₹1200 = 0.3333 = 33.33%
Costs	Costs/Sales = ₹900/₹1200 = 0.75 = 75%
Taxes	Taxes/(Taxable Income) = ₹90/₹300 = 0.3 = 30%
Net Income	(Net Income)/Sales = ₹210/₹1200 = 0.175 = 17.5%
Dividends	Dividends/(Net Income) = ₹70/₹210 = 0.3333 = 33.33%

Balance Sheet (₹ in Millions)						Income Statement (₹ in Millions)		
Assets	2012	%	Liabilities and Owners' Equity	2012	%		2012	%
Current Assets			Current Liabilities			Sales	1200	
Cash	200	16.67	Accounts Payable	400	33.33	Cost of Goods Sold	900	75.00
Accounts Receivable	400	33.33	Notes Payable	400	N/A	Taxable Income	300	25.00
Inventory	600	50.00	Total Current Liabilities	800		Taxes	90	30.00



Total Current Assets	1,200		Long-Term Liabilities			Net Income	210	17.50
			Long-Term Debt	500	N/A	Dividends	70	33.33
Fixed assets			Total Long-Term Liabilities	500		Addition to retained Earnings	140	66.67
Net Fixed Assets	800	66.67	Owners' Equity					
			Equity shares (₹1 par)	300	N/A			
			Retained Earnings	400	N/A			
			Total Owners' Equity	700				
Total Assets	2,000		Total Liability and Owners' Equity	2,000				

Partial Pro-Forma

The next step is to construct the Partial Pro-forma Financial Statements. First, determine the forecasted Sales level. This is done by multiplying Sales for the current year (2012) by one plus the forecasted growth rate in Sales.

$$S_1 = S_0(1 + g) = ₹1200(1 + .25) = ₹1500$$

Where

- S_1 = the forecasted Sales level,
- S_0 = the current Sales level, and
- g = the forecasted growth rate in Sales.

Once the forecasted Sales level has been determined, the Balance Sheet and Income Statement accounts which vary directly with Sales can be determined by multiplying the percentages by the Sales forecast. The accounts which do not vary directly with Sales are simply transferred to the Partial Pro-Forma Financial Statements at their current levels.

Retained Earnings on the Balance Sheet are the one item whose amount is determined using a slightly different procedure. The Partial Pro-Forma balance for Retained Earnings equals Retained Earnings in the current year plus the forecasted Addition to Retained Earnings from the Partial Pro-Forma Income Statement. The balances for summary accounts, such as Total Current Assets and Total Current Liabilities, are determined by summing their constituent accounts.

Partial Pro-Forma Calculations	
The examples in this box illustrate the calculations which were used to derive the following Partial Pro-Forma Balance Sheet and Income Statement.	
Cash	$(\text{Cash}\%)(\text{Sales Forecast}) = (16.67\%)(\text{₹}1500) = \text{₹}250$
Inventory	$(\text{Inventory}\%)(\text{Sales Forecast}) = 50\%(\text{₹}1500) = \text{₹}750$
Costs	$(\text{Costs}\%)(\text{Sales Forecast}) = 75\%(\text{₹}1500) = \text{₹}1200$
Addition to Retained Earnings	$(\text{Addition to Retained Earnings}\%)(\text{Net Income Forecast}) = 66.67\%(\text{₹}262.5) = \text{₹}175$
Retained Earnings (Balance Sheet)	Retained Earnings + Addition to Retained Earnings Forecast = $\text{₹}400 + \text{₹}175 = \text{₹}575$

Balance Sheet (₹ in Millions)						Income Statement (₹ in Millions)		
Assets	2012	2013	Liabilities and Owners' Equity	2012	2013		2012	2013
Current Assets			Current Liabilities			Sales	1200	1,500
Cash	200	250	Accounts Payable	400	500	Cost of Goods Sold	900	1,125
Accounts Receivable	400	500	Notes Payable	400	400	Taxable Income	300	375
Inventory	600	750	Total Current Liabilities	800	900	Taxes	90	112.5
Total Current Assets	1,200	1,500	Long-Term Liabilities			Net Income	210	262.5
			Long-Term Debt	500	500	Dividends	70	87.5
Fixed assets			Total Long-Term Liabilities	500	500	Addition to retained Earnings	140	175
Net Fixed Assets	800	1,000	Owners' Equity					
			Equity shares (₹1 par)	300	300			
			Retained Earnings	400	575			
			Total Owners' Equity	700	875			
Total Assets	2,000	2,500	Total Liability And Owners' Equity	2,000	2,275			

External Financing Needed (EFN)

The External Financing Needed (EFN) can be determined from the Partial Pro-Forma Balance Sheet. It is simply equal to the difference between Partial Pro-Forma Total Assets and Partial Pro-Forma Total Liabilities and Owners' Equity.

$$\text{EFN} = \text{₹}2,500 - \text{₹}2,275 = \text{₹}225$$

Pro-Forma Financial Statements

The final step is to determine how the EFN is to be raised. Firms can choose to raise the EFN by borrowing on short-term basis (Notes Payable), borrowing on a long-term basis (Long-Term Debt), issuing equity



(Equity Shares), or some combination of the above. The chosen method is called the **Plug**.

In this example we shall assume that the EFN is to be raised through long-term borrowing. Thus the plug is Long-Term Debt. To determine the Pro-Forma Financial Statements simply increase Long-Term Debt by the EFN of ₹225 determined in the previous step.

Balance Sheet (₹ in Millions)						Income Statement (₹ in Millions)		
Assets	2012	2013	Liabilities and Owners' Equity	2012	2013		2012	2013
Current Assets			Current Liabilities			Sales	1,200	1,500
Cash	200	250	Accounts Payable	400	500	Cost of Goods Sold	900	1,125
Accounts Receivable	400	500	Notes Payable	400	400	Taxable Income	300	375
Inventory	600	750	Total Current Liabilities	800	900	Taxes	90	112.5
Total Current Assets	1,200	1,500	Long-Term Liabilities			Net Income	210	262.5
			Long-Term Debt	500	500	Dividends	70	87.5
Fixed assets			Total Long-Term Liabilities	725	725	Addition to retained Earnings	140	175
Net Fixed Assets	800	1,000	Owners' Equity					
			Equity Shares (₹1 par)	300	300			
			Retained Earnings	400	575			
			Total Owners' Equity	700	875			
Total Assets	2,000	2,500	Total Liability And Owners' Equity	2,000	2,500			

The Process of Financial Forecasting:



10.2.2 Strategic Management and Strategy Levels

Strategic Management

Strategic management can be defined as the art and science of formulating, implementing and evaluating cross-functional decisions that enable an organization to achieve its objectives. As this definition implies, strategic management focuses on integrating management, marketing, finance/accounting, production/operations, research and development, and computer information systems to achieve organizational success. The term strategic management in this text is used synonymously with the term strategic planning. The latter term is more often used in the business world, whereas the former is often used in academia. Sometimes the term strategic management is used to refer to strategy formulation, implementation, and evaluation, with strategic planning referring only to strategy formulation. The purpose of strategic management is to exploit and create new and different opportunities for tomorrow; long-range planning, in contrast, tries to optimize for tomorrow the trends of today.

Stages of Strategic Management

The strategic management process consists of three stages:



Strategy formulation includes developing a vision and mission, identifying an organization's external opportunities and threats, determining internal strengths and weaknesses, establishing long-term objectives, generating alternative strategies, and choosing particular strategies to pursue. Strategy-formulation issues include deciding what new businesses to enter, what businesses to abandon, how to allocate resources, whether to expand operations or diversify, whether to enter international markets, whether to merge or form a joint venture, and how to avoid a hostile takeover.

Because no organization has unlimited resources, strategists must decide which alternative strategies will benefit the firm most. Strategy-formulation decisions commit an organization to specific products, markets, resources, and technologies over an extended period of time. Strategies determine long-term competitive advantages. For better or worse, strategic decisions have major multifunctional consequences and enduring effects on an organization. Top managers have the best perspective to understand fully the ramifications of strategy-formulation decisions; they have the authority to commit the resources necessary for implementation.

Strategy implementation requires a firm to establish annual objectives, devise policies, motivate employees, and allocate resources so that formulated strategies can be executed. Strategy implementation includes developing a strategy-supportive culture, creating an effective organizational structure, redirecting marketing efforts, preparing budgets, developing and utilizing information systems, and linking employee compensation to organizational performance.

Strategy implementation often is called the "action stage" of strategic management. Implementing strategy means mobilizing employees and managers to put formulated strategies into action. Often considered to be the most difficult stage in strategic management, strategy implementation requires personal discipline, commitment, and sacrifice. Successful strategy implementation hinges upon managers' ability to motivate employees, which is more an art than a science. Strategies formulated but not implemented serve no useful purpose.

Interpersonal skills are especially critical for successful strategy implementation. Strategy-implementation activities affect all employees and managers in an organization. Every division and department must decide on answers to questions, such as "What must we do to implement our part of the organization's strategy?" and "How best can we get the job done?" The challenge of implementation is to stimulate



managers and employees throughout an organization to work with pride and enthusiasm toward achieving stated objectives.

Strategy evaluation is the final stage in strategic management. Managers desperately need to know when particular strategies are not working well; strategy evaluation is the primary means for obtaining this information. All strategies are subject to future modification because external and internal factors are constantly changing. Three fundamental strategy-evaluation activities are (1) reviewing external and internal factors that are the bases for current strategies, (2) measuring performance, and (3) taking corrective actions.

Strategy evaluation is needed because success today is no guarantee of success tomorrow! Success always creates new and different problems; complacent organizations experience demise.

Strategy formulation, implementation, and evaluation activities occur at three hierarchical levels in a large organization: corporate, divisional or strategic business unit, and functional. By fostering communication and interaction among managers and employees across hierarchical levels, strategic management helps a firm function as a competitive team. Most small businesses and some large businesses do not have divisions or strategic business units; they have only the corporate and functional levels. Nevertheless, managers and employees at these two levels should be actively involved in strategic-management activities.

Benefits of Strategic Management

Strategic management allows an organization to be more proactive than reactive in shaping its own future; it allows an organization to initiate and influence (rather than just respond to) activities—and thus to exert control over its own destiny. Small business owners, chief executive officers, presidents, and managers of many for-profit and nonprofit organizations have recognized and realized the benefits of strategic management.

The manner in which strategic management is carried out is thus exceptionally important. A major aim of the process is to achieve the understanding of and commitment from all managers and employees. Understanding may be the most important benefit of strategic management, followed by commitment. When managers and employees understand what the organization is doing and why, they often feel that they are a part of the firm and become committed to assisting it. This is especially true when employees also understand linkages between their own compensation and organizational performance. Managers and employees become surprisingly creative and innovative when they understand and support the firm's mission, objectives, and strategies. Although making good strategic decisions is the major responsibility of an organization's owner or chief executive officer, both managers and employees must also be involved in strategy formulation, implementation, and evaluation activities. Participation is a key to gaining commitment for needed changes.

An increasing number of corporations and institutions are using strategic management to make effective decisions. But strategic management is not a guarantee for success; it can be dysfunctional if conducted haphazardly.

Strategy Levels:

A strategy is an entity's plan of action in relation to the external environment. Strategies at different levels are the outcome of different planning needs. The levels where strategy is employed are Corporate Level, Business Level and Functional Level.

The three hierarchical levels of strategy are:



Corporate Level Strategy:

Corporate level strategy occupies the highest level of strategic decision-making and covers actions dealing with the objective of the firm, acquisition and allocation of resources and coordination of strategies of various Strategic Business Unit (SBU) for optimal performance. Top management of the organization makes such decisions. The nature of strategic decisions tends to be value-oriented, conceptual and less concrete than decisions at the business or functional level.

Example: In a turbulent environment, the proactive mode is preferred and for a stable environment, reactive mode is preferred.

Corporate Strategy assigns priorities for allocation of corporate resources among various business units.

Business Level Strategy:

Business strategy is the managerial plan for achieving the goal of the business unit. It should be consistent with the corporate strategy of the firm and should be drawn within the framework provided by the corporate strategy.

The two most important internal aspects of a business strategy are identification of critical resources and development of distinctive competence for translation into competitive advantage.

Business-level strategy is – applicable in those organizations, which have different businesses-and each business is treated as strategic business unit (SBU). The fundamental concept in SBU is to identify the discrete independent product/market segments served by an organization. Since each product/market segment has a distinct environment, a SBU is created for each such segment. For example, Reliance Industries Limited operates in textile fabrics, yarns, fibers, and a variety of petrochemical products. For each product group, the nature of market in terms of customers, competition, and marketing channel differs.

Therefore, it requires different strategies for its different product groups. Thus, where SBU concept is applied, each SBU sets its own strategies to make the best use of its resources (its strategic advantages) given the environment it faces. At such a level, strategy is a comprehensive plan providing objectives for SBUs, allocation of re-sources among functional areas and coordination between them for making optimal contribution to the achievement of corporate-level objectives. Such strategies operate within the overall strategies of the organization. The corporate strategy sets the long-term objectives of the firm



and the broad constraints and policies within which a SBU operates. The corporate level will help the SBU define its scope of operations and also limit or enhance the SBU's operations by the resources the corporate level assigns to it. There is a difference between corporate-level and business-level strategies.

In other words, business strategy relates to the 'how' and corporate strategy to the 'what'. Corporate strategy defines the business in which a company will compete preferably in a way that focuses resources to convert distinctive competence into competitive advantage.'

Corporate strategy is not the sum total of business strategies of the corporation but it deals with different subject matter. While the corporation is concerned with and has impact on business strategy, the former is concerned with the shape and balancing of growth and renewal rather than in market execution.

Functional Level Strategy:

The functional level of the organization is the level of the operating divisions and departments. The strategic issues at the functional level are related to business processes and the value chain. Functional level strategies in marketing, finance, operations, human resources, and R&D involve the development and coordination of resources through which business unit level strategies can be executed efficiently and effectively.

Functional units of an organization are involved in higher level strategies by providing input into the business unit level and corporate level strategy, such as providing information on resources and capabilities on which the higher level strategies can be based. Once the higher-level strategy is developed, the functional units translate it into discrete action-plans that each department or division must accomplish for the strategy to succeed.

Below the functional-level strategy, there may be operations level strategies as each function may be divided into several sub functions. For example, marketing strategy, a functional strategy, can be subdivided into promotion, sales, distribution, pricing strategies with each sub function strategy contributing to functional strategy.

The three levels of strategies have different characteristics as shown below:

Dimensions	Levels		
	Corporate	Business	Functional
Impact	Significant	Major	Insignificant
Risk Involved	High	Medium	Low
Profit potential	High	Medium	Low
Time Horizon	Long	Medium	Low
Flexibility	High	Medium	Low
Adaptability	Insignificant	Medium	Significant

10.2.3 Interface of Financial Strategy with Corporate Strategic Management

1. Corporate Finance: The Corporate Finance theory implies that -

- Owners have the primary interest in the Firm.
- The current value of share is the measure of Shareholder's wealth.
- The Firm should accept only those investments which generate positive NPVs.
- The Firm's capital structure and dividend decisions are irrelevant, as they are solely guided by capital markets and management has no control over them.

2. Interface of Financial Policy with Corporate Strategic Management: No organization can run the existing business and promote a new expansion project without a suitable internally mobilized financial base or both internally and externally mobilized financial base. The following are the most important dimensions of a strategic plan.

- (a) **Sources of Finance:** The generation of funds may arise out of ownership capital and or borrowed capital. The broad types of Finance from which an organization can raise finance are Equity and Preference Capital and Loan Funds.
- (b) **Determination of Capital Structure:** Along with the mobilization of funds, policy makers should decide on the capital structure to indicate the desired mix of equity capital and debt capital. There is no ideal Debt Equity Ratio and this ratio in its ideal form varies from industry to industry. It also depends in the planning mode of the organization under study.
- (c) **Effective Utilisation of Resources / Capital Budgeting:**
- A planner has to frame policies for regulating investments in fixed assets and for restraining of current assets. Investment proposals mooted by different business units may be divided into three groups namely:
 - Addition of a product to the existing Product Portfolio.
 - Increase the level of operation of an existing product through either an increase in capacity in the existing plant or setting up of another plant for meeting additional capacity requirement.
 - Cost reduction and efficient utilization of resources through a new approach and or closer monitoring of the different critical activities for improvements.
 - Project evaluation and project selection are the two most important jobs under Capital Budgeting. Planner's task is to make the best possible allocation under resource constraints.
- (d) **Dividend Policy:** Dividend policy another area affecting, the strategic performance of the company. Dividend policy decision deals with - the extent of earnings to be distributed as dividend and the extent of earnings to be retained for future expansion scheme of the firm. From the point of view of long term funding of business growth, dividend can be considered as that part of total earnings, which cannot be profitably utilized by the company. The various Dividend Policies are -
- Constant (or Stable) dividend payments is a desirable consideration that can have a positive impact on share price.
 - The alternative policy of paying a constant percentage of the net earnings may be preferable from lesser risk for the investors.
 - Payment of a minimum Dividend per Share and additional Dividend when Earnings are higher than the Normal Earnings.
- (e) **Inter-Relationship:**
- The Financial Policy of a Company cannot be worked out in isolation of other Functional Policies. It has a close link with the overall Organizational performance and direction.
 - It is related to the external awareness of the investors about the firm's internal performance. The nature of interdependence of the policies is the crucial factor to be studied and modelled by using an in depth analytical approach.
 - This is a very difficult task compared to usual cause and effect study since at certain times corporate strategy is the cause and financial policy is the effect and at other times financial policy is the cause and corporate strategy is the effect.

10.2.4 Completed Financial Plan, Corporate Taxation and Financing, Promoter's Contribution

Financial Planning Process

In a well organized business, each function/department should arrange its activities to maximize its



contribution towards the attainment of corporate goals. The finance function should focus its attention in financial aspects of management decisions. Financial management is primarily concerned with the investment and financing decisions. The Financial management of a concern should fit into its strategic planning. Financial objectives of the firm should enable the firm to achieve its overall objectives. The investment decisions create the cash flow, which is central to the success of the firm; the finance decisions influence the cost of capital. The investment decisions are associated with business risk where as finance decisions are associated with financial risk. The financial decisions should enable the risk-return trade off, to maximize the value of firm.

Steps in Financial Planning Process

The financial planning process involves the following steps:

- (1) Clearly defined Mission and Goal** — At the outset, the top management should realize and recognize the importance of setting the organizational mission, goal and objectives, which should be clearly defined and communicated.
- (2) Determination of Financial Objectives** — In developing the financial objectives, a firm must consider its purpose, mission, goal and overall objectives of the firm. The financial objectives can again be transformed into strategic planning. The financial objectives can be classified into: (a) long-term objectives, and (b) short-term objective. The long-term financial objectives may relate to earnings in excess over the targeted return on capital employed, increase in EPS and market value of share, increase in market share of its product, achieve targeted growth rate in sales, maximization of value for shareholders *etc.* The short-term financial objectives relate to profitability, liquidity, working capital management, current ratio, operational efficiency *etc.*
- (3) Formulation of Financial Policies** — The next step in financial planning and decision making process is to formulate the financial policies which provide guides to decision making for attainment of both long-term and short-term financial objectives. For example, the company can frame its financial policies like:
 - (a) Debt-equity ratio and current ratio of the firm may be fixed at 3:2 and 2:1 respectively.
 - (b) A minimum cash balance has to be maintained at ₹1,00,000 always.
 - (c) The minimum and maximum levels are to be fixed for all items of raw material and consumable.
 - (d) The equity to be raised only by issue of equity shares.
 - (e) Profitability centre concept to be implemented for all divisions in the organization.
 - (f) The inter-divisional transfers to be priced at pre-determined transfer prices *etc.*
- (4) Designing Financial Procedures** — The financial procedures help the Finance manager in day to day functioning, by following the pre-determined procedures. The financial decisions are implemented to achieve the organizational goals and financial objectives. The financial procedures outline the cash flow control system, setting up of standards of performance, continuous evaluation process, capital budgeting procedures, capital expenditure authorization procedures, financial forecasting techniques to be used, preparation standard set of ratios, using of budgetary control system *etc.*
- (5) Search for Opportunities** — This involves a continuous search for opportunities which are compatible with the firm's objectives. The earlier opportunity is identified the greater should be the potential returns before competitors and imitators react.
- (6) Identifying Possible Course of Action** — This requires the development of business strategies from which individual decisions emanate. The available courses of action should be identified keeping in view the marketing, financial and legal restrictions or other forces not within the control of decision maker. For example, the additional funds requirement for expansion of the plant can be met by raising of finances from various sources.

- (7) Screening of Alternatives** — Each course of action is subjected to preliminary screening process in order to assess its feasibility considering the resources required, expected returns and risks involved. Readily available information must be used to ascertain whether the course of action is compatible with existing business and corporate objectives and likely returns can compensate for the risks involved.
- (8) Assembling of Information** — The Finance manager must be able to recognize the information needs and sources of information relevant to the decision. The cost-benefit trade-off must be kept in view in information gathering. To obtain more reliable information, the costs may be heavy in data gathering. The relevant and reliable information ensures the correct decision making and confidence in the decision outcome.
- (9) Evaluation of Alternatives and Reaching a Decision** — This step will involve the evaluation of different alternatives and their possible outcomes. This involves comparing the options by using the relevant data in such a way as to identify the best possible course of action that can enable in achieving the corporate objectives in the light of prevailing circumstances.
- (10) Implementation, Monitoring and Control** — After the course of decision is selected, attempts to be made to implement the decision to achieve the desired results. The progress of action should be continuously monitored by comparing the actual results with the desired results. The progress should be monitored with feedback reports, control reports, post audits, performance audits, progress reports etc. Any deviations from planned course of action should be rectified by making supplementary decisions.

Corporate Taxation and Financing

The influence of corporate taxation on corporate financing can be analysed in the following areas—

- 1. Financing Decisions — Cost of Capital:** Debt is cheaper than Equity since interest payable on loan is a charge on profit and will reduce the tax payable by the company. The use of cheaper cost debt funds has a leverage effect and increases the EPS of the company.
- 2. Investment Decisions — Capital Budgeting:** For project evaluation, the Cash Flows after Taxes (CFAT) are relevant for discounting purposes. Cash Outflows may also be reduced due to various deductions and allowances. The incidence of tax on income and on capital gains affects cash flows and investment decisions.
- 3. Dividend Decisions — Retention vs. Payment:** Tax is one of the major considerations in taking decisions on the amount and rate of dividend. Whether the company should retain all its earnings or distribute all earnings as dividend, also depends on tax incidence on the Company and its shareholders. The levy of taxes on dividends pushes the cost of equity capital of the company.
- 4. Evaluation of Cash Flows** — Depreciation is not an outgo in cash but it is deductible in computing the income subject in tax. There will be saving in tax on depreciation, and such savings could be profitably employed. Thus, both interest and depreciation provide tax shield and have a tendency to increase EPS.
- 5. Rehabilitation of Sick Units** — Unabsorbed Depreciation can be carried forward for 8 years, and this can be carried for set off in another Company's profit in case of amalgamations in specified circumstances. Such a provision will help in the growth of Companies and rehabilitation of sick units.
- 6. Protection of Internal Funds** — Tax implications should be taken care off in choosing the size and nature of industry and incentives are given for backward areas. Tax considerations are relevant for purpose of preserving and protecting internal funds.

Promoter's Contribution (in relation to financing a project)

- 1. Promoter's Contribution:** Promoter's Contribution indicates the extent of their involvement in a project in terms of their own financial stake. Promoters' Contribution consists of—



- (a) Subscription to Equity Share Capital and/ or Preference Share Capital.
 - (b) Rights shares to existing shareholders.
 - (c) Convertible Debentures issued as "rights" to existing Shareholders.
 - (d) Unsecured Loans.
 - (e) Seed Capital Assistance.
 - (f) Venture Capital.
 - (g) Internal Cash Accruals.
- 2. Minimum Contribution:** As per SEBI Guidelines, Promoters are expected to contribute minimum 20% of cost of post issue capital.
- 3. Margin:** Banks and Financial Institutions insist on Promoter's Contribution as Margin before granting debt assistance. The required margin limit may vary from 10% to 25% depending upon various factors. The lenders insist that the margin should be contributed in full at the initial stages of the project, before loan assistance is provided.

10.2.5 Cost of Capital – Cost of Different Sources of Capital, Weighted Average Cost of Capital, Marginal Cost of Capital, Capital Asset Pricing Model

Capital Asset Pricing Model: The capital asset pricing model (CAPM) helps us to calculate investment risk and what return on investment we should expect. The model starts with the idea that individual investment contains two types of risk:

Systematic Risk - These are market risks that cannot be diversified away. Interest rates, recessions and wars are examples of systematic risks.

Unsystematic Risk - Also known as "specific risk," this risk is specific to individual stocks and can be diversified away as the investor increases the number of stocks in his or her portfolio. In more technical terms, it represents the component of a stock's return that is not correlated with general market moves.

The return on an individual stock, or a portfolio of stocks, should equal its cost of capital. The standard formula remains the CAPM, which describes the relationship between risk and expected return.

Beta

According to CAPM, beta is the only relevant measure of a stock's risk. It measures a stock's relative volatility - that is, it shows how much the price of a particular stock jumps up and down compared with how much the stock market as a whole jumps up and down. If a share price moves exactly in line with the market, then the stock's beta is 1. A stock with a beta of 1.5 would rise by 15% if the market rose by 10%, and fall by 15% if the market fell by 10%.

Marginal Cost of Capital

1. Marginal Cost of Capital is the cost of raising an additional rupee of capital.
2. It is derived when the Average Cost of Capital is computed with marginal weights. The weights represent the proportion of funds the firm intends to employ.
3. When funds are raised in the same proportion as at present and if the component costs remain unchanged, there will be no difference between Average Cost of Capital and Marginal Cost of Capital.
4. As the level of Capital Employed increases, the component costs may start increasing. In such a case, both the WACC and Marginal Cost of Capital will increase. But marginal cost will rise at a faster rate.

10.2.6 Debt Financing — Margin Money, Refinancing, Bridge Finance, Syndication of Loan and Consortium, Seed Capital Assistance, Venture Capital Financing, Deferred Payment Guarantee

Debt Financing: Debt financing arise when a firm raises money for working capital or capital expenditures by selling bonds, bills, or notes to individual and/or institutional investors. In return for lending the money, the individuals or institutions become creditors and receive a promise that the principal and interest on the debt will be repaid.

Margin Money

Meaning: Margin Money is the cushion which Bankers keep to safeguard against changes in value of securities while extending loans against which loans are given to customers.

Factors: The quantum of Margin Money depends upon the credit-worthiness of the borrower and the nature of security.

Sources of Margin Money:

- In project cost financing, Margin Money has to be provided out of Promoter's Contribution.
- In the case of borrowing for Working Capital, Margin Money has to be provided as per norms that are prescribed from time to time by RBI.
- In the case of new projects, Margin Money required for Working Capital is included in the Project Cost.

Refinancing

Refinancing refers to the replacement of an existing debt obligation with a debt obligation bearing different terms. Refinancing may be undertaken to reduce interest costs (by refinancing at a lower rate), to extend the repayment time, to pay off other debts, to reduce one's periodic payment obligations (sometimes by taking a longer-term loan), to reduce or alter risk (such as by refinancing from a variable-rate to a fixed-rate loan), and/or to raise cash for investment, consumption, or the payment of a dividend.

Refinancing Institutions: The Institutions that provide refinancing facilities are —

(a) Industrial Development Bank of India (IDBI):

Point	Explanation
Objective	To serve as a principal financial institution for coordinating, the working of other financial institutions engaged in promoting, financing and developing industry.
Assistance provided	- Scheme for Modernisation of small and medium industries: The primary objective of this scheme of IDBI is to encourage industrial units in the small and medium sector to overcome the backlog of modernization. - Proposals for assistance should clearly indicate the necessity for modernization, benefits that would flow out of such modernization etc. - Promoting establishment of new enterprises especially in key industries. - Short term accommodation in the form of discounting / rediscounting commercial paper, Bills of Exchange etc. - Arranging technical or administrative assistance for industries.

(b) National Bank for Agriculture and Rural Development (NABARD).

The Apex Agriculture financing institution, NABARD channelizes assistance through an elaborate network of regional, state level, and filed level institutions like the Regional Rural Banks (RRBs), the State Co-operative Banks, and so on.

Bridge Finance



Meaning: Bridge Finance refers to loans taken by a company usually from commercial banks, for a short period, pending disbursement of loans sanctioned by financial institutions.

Sanction:

- (a) When a promoter or an enterprise approaches a financial institution for a long-term loan, there may be some normal time delays in project evaluation, administrative & procedural formalities and final sanction.
- (b) Since the project commencement cannot be delayed, the promoter may start his activities after receiving "in-principle" approval from the term lending institution.
- (c) To meet his temporary fund requirements for starting the project, the promoter may arrange short-term loans from commercial banks or from the term lending institution itself.
- (d) Such temporary finance, pending sanction of the long term loan, is called as "Bridge Finance".
- (e) This Bridge Finance may be used for - (i) paying advance for factory land / machinery acquisition, (ii) purchase of equipments, etc.

Terms:

- (a) **Interest:** The interest rate on Bridge Finance is higher when compared to term loans.
- (b) **Repayment:** These are repaid or adjusted out of the term loans as and when disbursed by the concerned institutions.
- (c) **Security:** These are secured by hypothecating movable assets, personal guarantees & promissory notes.

Syndication of Loan and Consortium

1 Syndication of a Loan:

- (a) A Financial Institution will take up the responsibility of appraising the project and taking up the entire loan within a specified time-frame.
- (b) This is generally done by taking a part of the exposure and offering the balance to other Financial Institutions and Banks. Generally, the other Financial Institutions do not take joint risk on the loan. Risk lies with the first financial institution.
- (a) The Borrower/ Customer will provide the financial institution concerned with a syndication fee.

2 Consortium:

- (a) All lending institutions have to take a joint risk on the loan.
- (b) It is considered time-consuming, as each member of the consortium has a say in the appraisal process.

Seed Capital Assistance

- 1. Applicability:** Seed Capital Assistance Scheme is designed by IDBI for professionally or technically qualified entrepreneurs and / or persons possessing relevant experience, skills and entrepreneurial traits. All the projects eligible for financial assistance from IDBI directly or indirectly through refinance are eligible under the scheme.
- 2. Amount of Finance:** The project cost should not exceed ₹2 Crores. The maximum assistance under the scheme will be - (a) 50% of the required Promoter's Contribution, or (b) ₹15 Lakhs, whichever is lower.
- 3. Interest and Charges:** The assistance is initially interest free but carries a service charge of 1% p.a. for the first five years and at increasing rate thereafter. When the financial position and profitability

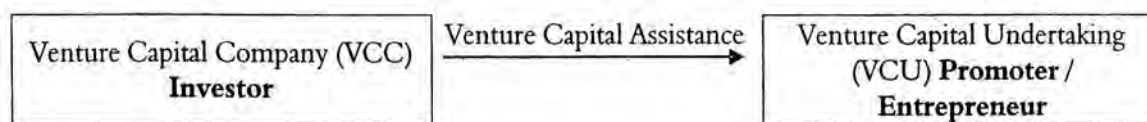
is favourable, IDBI may charge interest at a suitable rate even during the currency of the loan.

4. **Repayment:** The repayment schedule is fixed depending upon the repaying capacity of the unit with an initial moratorium of upto five years.
5. **Other Agencies:** For projects with a project cost exceeding ₹2 Crores, seed capital may be obtained from the Risk Capital and Technology Corporation Ltd. (RCTC). For small projects costing upto ₹5 Lakhs, assistance under the National Equity Fund of the SIDBI may be availed.

Venture Capital Financing

Meaning: Venture Capital Financing refers to financing of high risk ventures promoted by new, qualified entrepreneurs who require funds to give shape to their ideas. Here, a financier (called Venture Capitalist) invests in the equity or debt of an Entrepreneur (Promoter/Venture Capital Undertaking) who has a potentially successful business idea, but does not have the desired track record or financial backing.

Generally, venture capital funding is associated with - (a) heavy initial investment businesses e.g. energy conservation, quality up gradation or (b) sunrise sector like information technology.



Methods of Venture Capital Financing

- (a) **Equity Financing:** VCU's generally require funds for a longer period but may not be able to provide returns to the investors during initial stages. Hence, Equity Share Capital financing is advantageous. The Investor's contribution does not exceed 49% of the total Equity Capital of the VCU. Hence, the effective control and ownership remains with the entrepreneur.
- (b) **Conditional Loan:** A Conditional Loan is repayable in the form of a royalty after the venture is able to generate sales. No interest is paid on such loans. The rate of royalty (say 2% to 15%) may be based on factors like - (i) gestation period, (ii) cash flow patterns, (iii) extent of risk, etc., Sometimes, the VCU has a choice of paying a high rate of interest (say 20%) instead of royalty on sales once the activity becomes commercially sound.
- (c) **Income Note;** It is a hybrid type of finance, which combines the features of both conventional loan and conditional loan. The VCU has to pay both interest and royalty on sales but at substantially low rates.
- (d) **Participating Debentures:** Interest on such debentures is payable at three different rates based on the phase of operations - (i) Start-up and commissioning phase - NIL Interest (ii) Initial Operations Stage— Low rate of interest and (iii) After a particular level of operations - High rate of interest.

Deferred Payment Guarantee

Scheme: Suppliers of Machinery may provide deferred credit facility under which payment for the purchase of machinery can be made over a period of time.

Variants: In some schemes —

- (a) Initial down payment is made and the balance paid in suitable instalments.
- (b) Entire cost of the machinery is financed, and the company is not required to contribute any amount initially towards acquisition of the machinery.

Bank Guarantee: Supplier of machinery will generally insist that a Bank Guarantee should be furnished by the buyer.

For Whom? Deferred Payment Guarantee does not have a moratorium period for repayment. Hence,



it is advisable only for an existing profit making Company.

10.2.7 Lease Financing – Finance and Operating Lease, Lease Rentals, Sale and Lease Back, Cross Border Leasing

Leasing:

Leasing is a contract where one party (owner / Lessor / Leasing Company) purchases the assets and permits its use by another party (Lessee) over a specified period of time. Thus, leasing is an alternative to the purchase of an asset out of own or borrowed funds. In simple terms, it is the renting out of an asset by the owner to a person for a recurring consideration payable over the period of tenancy.

The Lessee pays a specified rent (Lease Rental Charges) at periodical intervals as consideration for the use of the asset. This constitutes the income of the Lessor.

Types of Lease:

Lease may be classified into - (a) Operating Lease, and (b) Financial Lease.

Characteristic features of Financial and Operating Lease

Aspects	Financial Lease	Operating Lease
Lease Term	Term of Financial Lease ranges from intermediate to long-term arrangement, i.e. the tenor of arrangement is closer to the economic life of the asset.	The Lease Term is significantly less than the economic life of the equipment.
Cancellation	During the primary lease period, the lease cannot be cancelled.	Operating Lease can be cancelled by the Lessee prior to its expiration date.
Amortization of Cost	The lease is more or less fully amortized during the primary lease period.	The lease rental is generally not sufficient to fully amortize the cost of the asset.
Maintenance and Taxes	The costs of maintenance, taxes, insurance are to be incurred by the Lessee, unless the contract provides otherwise.	The costs of maintenance, taxes, insurance are the responsibility of the Lessor.
Risk of Obsolescence	The Lessee is required to take the risk of obsolescence.	The Lessee is protected against the risk of obsolescence.
Interest on the Asset	The Lessor is only the financier and is not interested in the asset.	Lessor has the option to recover the cost of asset from another party, on cancellation of the lease by leasing out the asset.

Advantages of a leasing transaction, from the Lessor's perspective as well as from the Lessee's perspective

1. Advantages to the Lessor:

- (a) **Full Security:** Lessor's interest is fully secured as he is always the owner of the asset and can take repossession of the asset, if the Lessee defaults.
- (b) **Tax Benefits:** Tax Relief is available by way of depreciation. If the lessor is in high tax bracket, he can lease out assets with high depreciation rates and thus reduce his tax liability substantially. Besides, the rentals can be suitably structured to pass on some tax benefit to the assessee. Generally, assets that are leased out carry a higher depreciation rate.
- (c) **High Profits:** Because of a higher depreciation charge, there is a quicker capital recovery and also higher profitability since rate of return is more what is available in case of lending

business.

- (d) **Trading on Equity:** Lessor's have very low equity and use substantial amount of borrowed funds and deposits for their business. Thus, they carry out their operation with great financial leverage. Hence, the return on equity is very high.

2. Advantages to the Lessee:

- (a) **100% Financing:** Financing available for use of asset upto 100% of purchase cost, without making any down payment or margin payment.
- (b) **No dilution of Ownership:** Leasing provides finance without diluting the ownership or control of the promoters, unlike equity or debt financing.
- (c) **No Loss of Control:** In case of Institutional Financing (Bank and Other Term Lending Institutions), the lender may have restrictive conditions in the sanction letter such as representation in the Board, conversion of debt into equity, payment of dividend, etc. Such restrictions are not present in case of lease financing. This enhances the independence of the firm in its operations.
- (d) **Tax benefits:** Since the entire lease rental is treated as an expenditure, cost of the asset is amortized rapidly under this option, and hence there is huge tax savings, when compared to similar outflow under borrow and procure option.
- (e) **Less Risk:** Risk of obsolescence rests with the lessor, and the Lessee always has the option of replacing the asset with latest technology, by opting for a different asset or lessor.
- (f) **Sale and Leaseback:** By employing sale and lease back arrangement, the lessee may overcome a financial crisis by immediately arranging financial resources.

Limitations of Leasing:

- (a) **Restrictions on Use:** The lessor generally imposes certain restrictions on the leased assets. The Lessee may not be permitted to make additions or alterations to suit his needs.
- (b) **High Payout:** A Financial Lease may entail a higher payout obligation, if the equipment is not found useful subsequently, and the lessee opts for premature termination of the Lease arrangement.
- (c) **No Ownership:** In most circumstances, the Lessee does not become the owner of the asset, and is thus deprived of the residual value of the asset.
- (d) **Cost:** In case of default, it leads to heavy damage to the lessor.
- (e) **Understatement of Lessee's Assets:** Leased assets are not considered lessee's assets, and therefore, they do not appear in the Balance Sheet of the lessee as an asset. To this extent, the assets of the lessee's business would be understated.
- (f) **Double Sales Tax:** With the imposition of sale tax by various states, the assets is subjected to sales tax, both when lessor purchases (from the Lessee himself or from some other party), as well as when he leases it to the lessee.

Different Methods of Structuring a Lease Rental

Structuring of a Lease Rental refers to the determination of the timing and the amount of lease rentals. Lease rentals are tailor-made to enable the lessee to pay from the funds generated from its operations. Lease rentals can be of the following types

- (a) **Equal Annual Plan:** Here the lease rentals are charged equally throughout the period of the Lease.
- (b) **Deferred Lease Rentals:** Here the rentals are structured in such a manner that there is a moratorium for an agreed initial period, so that the lease rentals can be paid as and when funds are generated from the operations of the lessee.



- (c) **Stepped up Lease Rentals:** Here, there is a constant rate of increase in the amount of Lease Rentals charged throughout the period of lease.
- (d) **Balloon Lease Rentals:** Here the lease rent is generally low throughout the lease, but a payment called as Balloon payment is required to be paid at a future date. This is a lump sum payment which seeks to cover the shortfall in the lease rentals collected each year. Subsequently, normal lease rentals are charged.

Example: If profits from the leased plant start from the third year and go on increasing, then lessee will structure the installments of the plant in such a way that he will pay more amounts in the 4th year and onwards i.e. Ballooned lease rentals.

Sale and Leaseback

- (a) **Definition:** Under a Sale and Leaseback transaction, the owner of the asset, sells it to another person, and takes back the asset on lease. Under this transaction, only the ownership is transferred, the possession remains with the original owner, who pays lease rentals to the new owner (lessor).
- (b) **Interdependence:** Lease payments and the sale price are usually interdependent as they are negotiated as a package.
- (c) **Purpose:** It is generally done to raise funds immediately required by lessee for working capital or other purposes. Sometimes, it can also be used as a tax saving mechanism.
- (d) **Benefits:** The lessee continues to make economic use of assets against payment of lease rentals while ownership vests with the lessor.

Cross Border Leasing

Cross-border leasing is a leasing arrangement where lessor and lessee are situated in different countries. Cross-border leasing can be considered as an alternative to equipment loans to foreign buyers, the only difference being the documentation, with down payments, payment streams, and lease-end options the same as offered under Equipment Loans. Operating leases may be feasible for exports of large equipment with a long economic life relative to the lease term.

Objectives of Cross Border Leasing:

- (a) **Overall Cost of Financing:** A major objective of cross-border leases is to reduce the overall cost of financing through utilization by the lessor of tax depreciation allowances to reduce its taxable income. The tax savings are passed through to the lessee as a lower cost of finance. The basic prerequisites are relatively high tax rates in the lessor's country, liberal depreciation rules and either very flexible or very formalistic rules governing tax ownership.
- (b) **Security:** The lessor is often able to utilize non-recourse debt to finance a substantial portion of the equipment cost. The debt is secured by among other things, a mortgage on the equipment and by an assignment of the right to receive payments under the lease.
- (c) **Accounting Treatment:** Also, depending on the structure, in some countries the lessor can utilize very favourable "Leveraged Lease" Financial Accounting treatment for the overall transaction.
- (d) **Repossession:** In some countries, it is easier for a lessor to repossess the leased equipment following a Lessee default because the lessor is an owner and not a mere secured lender.

Advantages of Cross Border Leasing

- (a) **Double Dip Lease:** Cross-border leasing has been widely used to arbitrage the difference in the tax laws of different countries thus making them tax avoidance and tax shelters. This is possible since each country applies differing rules for determining whether the party acting as lessor under a cross-border lease is the "owner" of the leased asset for tax purposes enabling him to claim tax allowances.

Example: In the United States the criteria is - Does the lessor possess substantially all attributes of economic ownership of the leased asset. In the European Union: Formalistic Property law concepts and focus primarily on the location of legal title, although these countries usually also require that the lessor have some attributes of economic ownership or, at least, that the lessee have only a minimal economic interest in the equipment. In these cases, with sufficiently long leases (often 99 years), an asset can end up with two effective owners, one each in different countries, this is often referred to as a double-dip lease.

- (b) **Sale and Lease Back:** Often the original owner of an asset is not subject to taxation in any country and therefore not able to claim depreciation. The transaction often involves an entity selling an asset (such as sewerage system or power plant) to an investor (who can claim depreciation), and long-term leasing it right back (often referred to as a sale leaseback).
- (c) **Financing Infrastructure:** Cross-border leasing has been in practice as a means of financing infrastructure development in emerging nations. Cross-border Leasing may have significant applications in Financing Infrastructure development in emerging nations such as rail and air transport equipment, telephone and telecommunications, equipment, and assets incorporated into power generation and distribution systems and other projects that have predictable revenue streams.

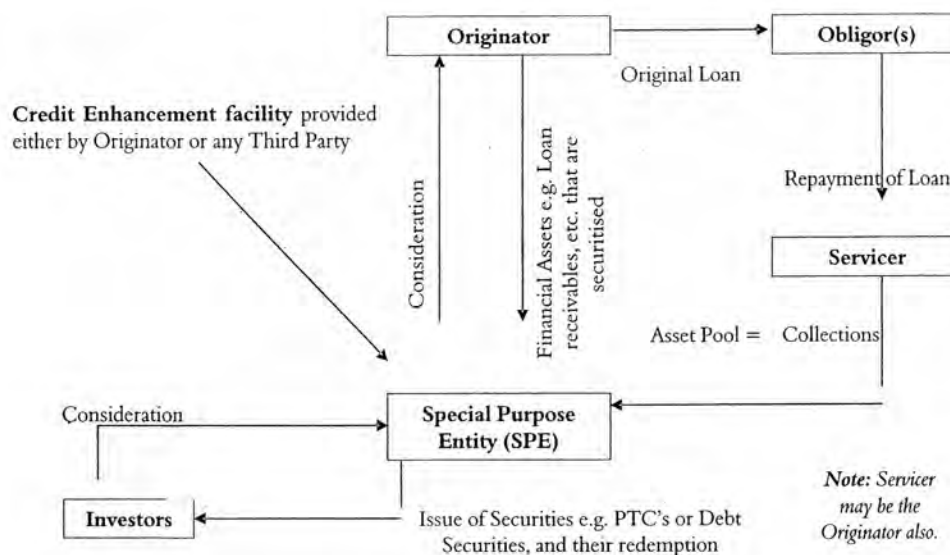
10.2.8 Debt Securitization- Features, Advantages, Factoring, Forfeiting, Bill Discounting

Securitisation:

- (a) Securitisation is the process by which financial assets (e.g. Loan Receivables, Mortgage backed receivables, Credit Card balances, Hire Purchase Debtors, Trade Debtors, etc.) are transformed into securities. Securitisation is different from Factoring since the latter involves transfer of debts without transformation thereof into securities.
- (b) Securitisation is a mode of financing, wherein securities are issued on the basis of a package of assets (called Asset Pool). In this method of recycling funds, assets generating steady cash flows are packaged together and against this asset pool, market securities can be issued.

Securitisation Flow:

The parties involved and the Securitisation Process is described as under -





Securitisation Process

- (a) Initial Lending / Origination Function:** Originator gives various Loans to different Borrowers (Obligors). Borrowers have to repay the loans in EMFs (Interest + Principal). These EMI's constitute financial assets / receivables for the Originator.
- (b) Securitisation Function:** Financial Assets / Receivables or defined rights therein, are transferred, fully or partly, by the Originator to a SPE. SPE pays the Originator immediately in cash or in any other consideration for taking over the financial assets. The assets transferred are termed 'Securitized Assets' and the assets or rights retained by the Originator are called 'Retained Assets'.
- (c) Financing Function:** SPE finances the assets transferred to it by issue of securities such as Pass Through Certificates (PTCs) and/or debt securities to Investors. These are generally sold to Investors (Mutual Funds, LIC, etc), through Merchant Bankers.

Features of Securitisation

- 1. Servicing:** The Originator may continue to service the securitised assets i.e. collect amounts due from borrowers, etc.) with or without servicing fee for the same. Sometimes, the Servicer may be an entity other than the Originator.
- 2. Spread:** The Originator usually keeps the spread available (i.e. difference) between yield from secured assets (interest received from Borrowers) and interest paid to Investors (of securities). This constitutes Originator's income.
- 3. Forms:** In a simple "Pass Through Structure", the investor owns a proportionate share of the asset pool and the cash flows when generated are passed on directly to the investor. This is done by issuing "Pass Through Certificates". However, in mortgage or asset backed bonds, the investor has a lien on the underlying asset pool. The SPE accumulates collections from borrowers from time to time and makes payments to investors at regular pre-determined intervals. The SPE can invest the funds received in short term instruments and improve yield when there is time lag between receipt and payment.
- 4. Future Receivables:** The Originator may securitise or agree to securitise future receivables, i.e., receivables that are not existing at the time of agreement but which would be arising in future. In case of such securitisation, the future receivables are estimated at the time of entering into the transaction and the purchase consideration for the same is received by the Originator in advance.
- 5. Revolving Period Securitisation:** Future receivables can be transferred as and when they arise, or at specified intervals, the transfers being on pre-arranged terms.
- 6. Recourse:** The securitisation process is generally without recourse i.e. the investor bears the credit risk or risk of default and the issuer is under an obligation to pay to investors only if the cash flows are received by him from the asset pool. However, the Originator has a right to legal recourse against the borrower in the event of default.
- 7. Credit Enhancement:** It is an arrangement designed to protect the Investors (i.e. holders of the securities issued by an SPE) from losses and / or cash flow mismatches arising from shortfall or delays in collections from the securitised assets. The arrangement often involves one or more of the following—
 - (a) Cash Collateral:** Deposit of cash which can be used by the SPE, in specified circumstances, for discharging its financial obligation on its securities held by the investors.
 - (b) Over Collateralisation:** Assets in excess of the securitised assets are made available to the SPE, so that their realisation can be used to fund the shortfalls and / or mismatches in fulfillment of SPE's financial obligations.
 - (c) Recourse Obligation:** Obligation accepted by the Originator of the Securitisation Process.

- (d) **Third Party Guarantee:** Guarantee given by any third party, to meet any shortfall on the part of the SPE in meeting its financial obligations in respect of the securitisation transaction.
- (e) **Structuring of Instruments:** Instruments issued by an SPE are structured into Senior Securities (issued to Investors) and Subordinate Securities (issued to Originators). Payments on subordinated securities are due only after the amounts due on the senior securities are discharged.

Advantages of Securitisation

To the Originator

1. The assets are shifted off the Balance Sheet, thus giving the Originator recourse to off-Balance Sheet funding.
2. It converts illiquid assets to liquid portfolio.
3. It facilitates better Balance Sheet management as assets are transferred off Balance Sheet facilitating satisfaction of capital adequacy norms.
4. The Originator's credit rating enhances

To the Investor

1. Securities are tied up to definite assets (Asset Pool).
2. New investment avenues are opened up.

Factoring

Factoring is an arrangement under which a Firm (called Borrower) receives advances against its receivables, from a financial institution (called Factor). The Factor also provides certain allied services e.g. Debtors follow-up, Maintenance of Debtors Ledger, etc. on behalf of the Borrower.

Procedure: The Factoring procedure is as under -

- (a) The Borrower sells his Accounts Receivables (i.e. Book Debts) to the Factor.
- (b) The factor purchases the receivables and provides advances against them, after deducting and retaining — (i) a suitable margin/ reserve, (ii) Factor's Commission / Fees and (c) Interest on Advance.
- (c) The Borrower forwards collections from his customers / Buyers, to the Factor and thus settles the advances received by him.
- (d) The Factor may also provide allied services like credit investigation, sales ledger management, collection of debts, credit protection and risk bearing.

Types of Factoring

- (a) **Disclosed vs. Undisclosed Factoring:** In disclosed factoring, all parties Factor, Borrower / Seller and the Buyer, is aware of the other's presence in the arrangement. However, in undisclosed factoring, the factoring arrangement is not known to the Buyer of goods.
- (b) **Recourse vs. Non Recourse Factoring:** In Recourse Factoring, in case of default by the customer, the risk of bad debts is borne by the Borrower and not the Factor. In Non-Recourse Factoring, the risk of bad debts is borne by the Factor himself. The rate of Commission is higher in case of Non-Recourse Factoring, to compensate the Factor for the additional risk borne by him.

Conditions: Various conditions are laid down by the Factor for factoring arrangements. Some are -

- (a) Fixing Credit Limits for each borrower and each customer,
- (b) Exclusion of certain customers from factoring- e.g. sale to sister concerns cannot be factored,



- (c) Standardisation of invoices,
- (d) Acknowledgement from Customer for actual supply of goods under the invoice,
- (e) Instruction to customers that the payments shall be forwarded directly to the Factor.

Advantages:

- (a) Convertibility: Accounts receivables are easily converted into cash.
- (b) Definite pattern of cash inflows: Supply invoices are factored immediately. Hence, cash inflows follow the sale pattern.
- (c) Reduction in Collection and Administration Costs: There is no need for a separate credit department since credit management may also be undertaken by the Factor.
- (d) Flexibility: The Seller Firm may continue to finance its receivables continuously, on a more or less automatic basis. If value of sales increase or decrease, it can vary the financing proportionately.
- (e) Compensating balances are not required in case of factoring, unlike Unsecured Loans. However, the Factor may not give 100% advance, he may reduce a reserve / margin and advance only the balance.

Forfaiting

Forfaiting refers to the exporter relinquishing his right to a receivable due at a future date in exchange for immediate cash payment, at an agreed discount, passing all risks and responsibilities for collecting the debt to the Forfeiter.

Features:

- (a) Forfaiting is a form of financing of receivables pertaining to International Trade.
- (b) It is the discounting of international trade receivables on a 100% "without recourse" basis.
- (c) It denotes the purchase of trade bills/ promissory notes by a Bank / Financial Institution without recourse to the Seller.
- (d) The purchase is in the form of discounting the documents covering entire risk of non-payment in collection.
- (e) Forfaiting transforms the supplier's credit granted to the importer into cash transaction for the exporter, protecting him completely from all the risks associated with selling overseas on credit.

Bill Discounting

Business activities across borders are done through letter of credit. Letter of credit is an instrument issued in the favour of the seller by the buyer bank assuring that payment will be made after certain timer frame depending upon the terms and conditions agreed, it could be either sight, 30 days from the bill of Lading or 120 days from the date of bill of lading. Now when the seller receives the letter of credit through bank, seller prepares the documents and presents the same to the bank. The most important element in the same is the bill of exchange which is used to negotiate a letter of credit. Seller discounts that bill of exchange with the bank and gets money. Discounting bill terminology is used for this purpose. Now it is seller's bank responsibility to send documents and bill of exchange to buyer's bank for onward forwarding to the buyer for the acceptance and the buyer finally, accepts bill of exchange drawn by the seller on buyer's bank because he has opened that Letter of Credit. Buyers bank then get that signed bill of exchange from the buyer as guarantee and release payment to the sellers bank and waits for the time span.

Difference between Bills Discounting and Factoring

Aspect	Bills Discounting	Factoring
Parties	Buyer of Goods = Drawee. Seller of Goods = Drawer. Financier = Payee.	Buyer of Goods = Debtor. Seller of Goods = Client. Financier = Factor.
Nature	Bill Discounting is a method of borrowing from Commercial Banks.	It is a method of management of Book Debts / Receivables.
Basis of Financing	Security provision as well as requirement of finance, which determine the amount of financing.	Basis of financing is turnover with a specified j party.
Pattern of financing	The entire amount of the Bill of Exchange is discounted and provided at the time of transaction itself.	Factor gives an advance (say 90%) at the time of transaction, and provides the balance (i.e. 10%), at the time of settlement/ end of credit period.
Additional Services	The Financier (Banker) provides advance / finance against the Bill of Exchange / Invoice.	Factor provides financing services, and other services like Debtors follow-up, Debtors Ledger Maintenance, Collection Mechanism, Credit Reports on Debtors, etc.
Income to Financier	Banker earns "Discounting Charges" on the transaction.	Factor earns "Interest" for the financing service, and "Commission" for other services rendered.
Risk of Bad Debts	In Bill Discounting, risk of bad debts is retained by the Seller of goods.	In non-recourse factoring, the risk of bad debts is passed on to the Factor.
Statute	Negotiable Instrument Act is applicable.	There is no specific applicable Statute.

Difference between Factoring and Securitisation

Basis	Factoring	Securitisation
Range of Investors	In Factoring, only one party is involved.	Issues of securitisation are sold to a wide range of investors.
Issue Expenses	No issue expenses are involved in Factoring.	Issue expenses are involved.
Recourse	Factoring may be with or without Recourse.	Securitisation is generally without recourse.
Receipt of payment	Payment from the Factor comes in after a time lag, during which the Factor charges interest for any advances allowed.	In securitization, cash is generally received as soon as the issue is placed.
Other Services	Services such as credit checking and ledger maintenance are offered along with Factoring.	Securitization does not carry any such services with it.
Time Period	Short-term receivables are factored.	Long term receivables and Short-term receivables can be securitized.
Credit Rating	Credit Rating is not compulsory.	Credit rating is compulsory.
Availability	Factoring Resources are readily available.	Investors of securitized instruments are to be identified.



Mature of Receivables	Only existing receivables can be factored.	Future and existing receivables can be securitized.

Difference between Factoring and Forfaiting

Basis	Factoring	Forfaiting
Extent of finance	Usually 80% or 90% of the value of the invoice is considered for advance.	100% financing.
Credit worthiness	Factor does the credit rating of the counterparty in case of a non-recourse factoring transaction.	The Forfaiting Bank relies on the credibility of the availing bank.
Services provided	Day to day administration of sales and other allied services are provided.	No services are provided.
Maturity	Advances are short-term in nature.	Advances are generally medium term.

10.3 INTERNATIONAL INVESTMENTS

International investing is a type of investment that involves purchasing securities that originate in other countries. This type of investment is popular because it can provide diversification and opportunities for superior growth. There are many different ways to invest internationally including through mutual funds, exchange traded funds (ETFs) and American depository receipts.

10.3.1 International Financial Markets

Not surprisingly, most of the major financial markets attract both investors and fund raisers from abroad. That is, these markets are also international financial markets, where foreigners can both borrow and lend money. International financial markets can develop anywhere, provided that local regulations permit the market and that the potential users are attracted to it. The most important international financial centers are London, Tokyo, and New York. All the other major industrial countries have important domestic financial markets as well, but only some, such as Germany and—recently—France, are also important international financial centers. On the other hand, some countries that have relatively unimportant domestic financial markets are important world financial centers. The markets of those countries, which include Switzerland, Luxembourg, Singapore, Hong Kong, the Bahamas, and Bahrain, serve as financial entrepôts, or channels through which foreign funds pass. That is, these markets serve as financial intermediaries between non resident suppliers of funds and nonresident users of funds.

Political stability and minimal government intervention are prerequisites for becoming and remaining an important international financial center, especially an entrepot center. Historically, London's preeminence as an entrepot for international finance comes from its being a lightly regulated offshore market in a world of financial rigidities. That is why it became home to the Euromarkets about 40 years ago. As financial markets deregulate, London's strength has shifted to its central location (including its central time zone) and financial infrastructure—its access to information by dint of its position astride huge international capital flows, its pool of financial talent, its well developed legal system, and its telecommunications links. Even more important, financial firms need to be near big investors, and there is more money under management in London than anywhere else in Europe.

Foreign Access to Domestic Markets

Despite the increasing liberalization of financial markets, governments are usually unwilling to rely completely on the market to perform the functions of gathering and allocating funds. Foreigners in particular are often hampered in their ability to gain access to domestic capital markets because of government-imposed or government-suggested restrictions relating to the maturities and amounts of money that they can raise. They are also hampered by the government-legislated extra costs, such as

special taxes (for example, the U.S. interest equalization tax, or IET, in effect from 1963 to 1974), which they must bear on those funds that they can raise. Nonetheless, the financial markets of many countries are open wide enough to permit foreigners to borrow or invest.

As a citizen of many nations, the multinational firm has greater leeway in tapping a variety of local money markets than does a purely domestic firm, but it, too, is often the target of restrictive legislation aimed at preserving local capital for indigenous companies or the local government. The capital that can be raised is frequently limited to local uses through the imposition of exchange controls. As we have seen previously, however, multinationals are potentially capable of transferring funds, even in the presence of currency controls, by using a variety of financial channels. To the extent, therefore, that local credits substitute for parent- or affiliate-supplied financing the additional monies are available for removal.

The Foreign Bond Market. The foreign bond market is an important part of the international financial markets. It is simply that portion of the domestic bond market that represents issues floated by foreign companies or governments. As such, foreign bonds are subject to local laws and must be denominated in the local currency. At times, these issues face additional restrictions as well. For example, foreign bonds floated in Switzerland, Germany, and the Netherlands are subject to a queuing system, where they must wait for their turn in line.

The United States and Switzerland contain the most important foreign bond markets. (Dollar-denominated foreign bonds sold in the United States are called **Yankee bonds**.) Major foreign bond markets are also located in Japan and Luxembourg. (Yen bonds sold in Japan by a non-Japanese borrower are called **Samurai bonds**, in contrast to **Shogun bonds**, which are foreign currency bonds issued within Japan by Japanese corporations.)

In recent years, more of these foreign bond offerings have consisted of global bond issues. A global bond issue is an offering, usually denominated in dollars that is registered in several national jurisdictions and marketed to investors around the world. A typical global issue is Philip Morris's \$ 1 billion eight-year bond offering sold in 1997. The benefits of these global offerings are that issuing companies become better known overseas, broaden their investor base, and often save on financing costs.

Foreign bond issues, like their purely domestic counterpart, come in three primary flavors: fixed-rate issues, floating-rate notes (FRNs), and equity-related issues. **Fixed-rate issues** are similar to their domestic counterparts, with a fixed coupon, set maturity date, and full repayment of the principal amount at maturity. **Floating-rate notes** have variable coupons that are reset at fixed intervals, usually every three to six months. The new coupon is set at a fixed margin above a mutually agreed-upon reference rate such as the Treasury bill rate or the commercial paper rate.

Equity-Related Bonds: It combine features of the underlying bond and common stock. The two principal types of equity-related bonds are convertible bonds and bonds with equity warrants. **Convertible bonds** are fixed-rate bonds that are convertible into a given number of shares before maturity. **Equity warrants** give their holder the right to buy a specified number of shares of common stock at a specified price during a designated time period. The relative amount of foreign bonds issued in the three different categories varies from year to year depending on market conditions.

After the economic crisis in Asia, Asian corporations scrambled for new equity to recapitalize and shore up balance sheets overloaded with debt and unsupported by much remaining equity at the new exchange rates. The preferred method of providing new equity or its equivalent was through convertible bonds and preferred shares. Both give fresh money coming into a troubled company a higher claim on assets under liquidation than would straight equity, while at the same time providing a significant upside opportunity for investors who thought the markets had overreacted.

The benefit for struggling companies is that convertibles reduce debt-service charges. Reuse they carry lower interest rates than the debt they replace. In addition, upon conversion (if it occurs), the debt becomes equity.



The Foreign Bank Market: The foreign bank market represents that portion of domestic bank loans supplied to foreigners for use abroad. As in the case of foreign bond issues, governments often restrict the amounts of bank funds destined for foreign purposes. Foreign banks, particularly Japanese banks, have become an important Banking source for U.S. corporations.

One indication of the importance of foreign banks is the fact that only four out of the world's 25 largest banks ranked by assets as of the end of 2003 were American. The Japanese (who had the largest, Mizuho Financial Group), British, and Germans had four top-25 banks each, the French and Dutch had three each, and were Swiss, with the Chinese and Belgians having one top-25 bank apiece. The minimal representation by American banks among the world's largest can be attributed primarily to prohibitions on interstate banking in the United States. However, it should be noted that size is not everything. In terms of market capitalization, which reflects current and anticipated profitability, U.S. banks shine, accounting for five of the top ten most valuable banks, just one of the 10 largest banks by market capitalization was Japanese, reflecting Japanese banks' dismal profit outlook and huge loan losses.

The Foreign Equity Market: The idea of placing stock in foreign markets has long attracted corporate finance managers. One attraction of the foreign equity market is the diversification of equity funding risk: A pool of funds from a diversified shareholder base insulates a company from the vagaries of a single national market. Some issues are too large to be taken up only by investors in the national stock market. For large companies located in small countries, foreign sales may be a necessity. When KLM, the Dutch airline, issued 50 million shares to raise \$304 million, it placed 7 million shares in Europe, 7 million in the United States, and 1 million in Japan. According to a spokesman for the company, "The domestic market is too small for such an operation."

Selling stock overseas also can increase the potential demand for the company's shares, and hence its price, by attracting new shareholders. For example, a study by Gordon Alexander, Cheol Eun, and S. Janakiraman found that foreign companies that listed their shares in the United States experienced a decline in their required return, boosting their stock prices. Similarly, Dennis Logue and Anant Sundaram found that cross-listing foreign companies in the United States enhance the valuations for the listing companies by up to 10% relative to country and industry benchmarks. This evidence is consistent with the theoretical work of Robert Merton, who has shown that a company can lower its cost of equity capital and thereby increase its market value by expanding its investor base.

For a firm that wants to project an international presence, an international stock offering can spread the firm's name in local markets. In the words of a London investment banker, "If you are a company with a brand name, it's a way of making your product known and your presence known in the financial markets, which can have a knock-off effect on your overall business. A marketing exercise is done; it's just like selling soap." According to Apple Computer's investor relations manager, Apple listed its shares on the Tokyo exchange and the Frankfurt exchange "to raise the profile of Apple in those countries to help us sell computers. In Japan, being listed there gets us more interest from the business press." Recent empirical researches support the hypothesis that raising equity globally is associated with significant benefits.

Global Financial System (GFS) - Definition

A brief definition of the **global financial system (GFS)** is the financial system consisting of institutions, their customers, and financial regulators that act on a global level.

The term global is often used synonymously with the terms "international" or "multinational". Economists do not have a standard definition for a global versus a multinational company.

Main Players

1. Global or international systemically important financial institutions, e.g., banks, hedge funds whose failure may cause a global financial crisis, the International Monetary Fund and the Bank for International Settlements,
2. Customers of the global financial system, which include multinational corporations, as well as

countries, with their economies and government entities, e.g., the central banks of the G20 major economies, finance ministries EU, NAFTA, OPEC, and others.etc.

3. Regulators of the global financial system, many of which play dual roles, in that they are financial organizations at the same time. These include the above mentioned International Monetary Fund and Bank for International Settlements, particularly its "Global Economy Meeting (GEM), in which all systemic emerging economies' Central Bank governors are fully participating, has become the prime group for global governance among central banks" per Jean-Claude Trichet, President of the European Central Bank., as well as the financial regulators of the U.S.A (the US agency quintet of Federal Reserve, Office of Comptroller of the Currency, Federal Deposit Insurance Corporation, Commodity Futures Trading Commission, Federal Reserve Board, Securities and Exchange Commission), Europe (European Central Bank) and the Bank of China, besides others.

Global Financial Institutions

The most prominent public international financial institutions are:

- The International Monetary Fund keeps tabs of international balance of payments accounts of member states. The IMF acts as a lender of last resort for members in financial distress, e.g., currency crisis, problems meeting balance of payment when in deficit and debt default. Membership is based on quotas, or the amount of money a country provides to the fund relative to the size of its role in the international trading system.
- The World Bank aims to provide funding, take up credit risk or offer favorable terms to development projects mostly in developing countries that couldn't be obtained by the private sector. The other multilateral development banks and other international financial institutions also play specific regional or functional roles.
- The World Trade Organization settles trade disputes and negotiates international trade agreements in its rounds of talks (currently the Doha Round).
- The Bank for International Settlements (BIS) in Basel Switzerland, which is both a bank as well as an intergovernmental organization for central banks worldwide. It has numerous subsidiary bodies, most importantly the Basel Committee on Banking Supervision, the Financial Stability Board, and the BIS Joint forum on financial conglomerates.^[5] It publishes global bond market capitalization data.
- The World Economic Forum, a Swiss "non-profit" foundation based in Geneva meeting annually in Davos.

The most prominent private international financial institutions are:

- The Institute of International Finance (IIF), a trade organization of the world's largest commercial banks and investment banks.
- The World Federation of Exchanges (WFE) which publishes global stock capitalization information in annual reports.^[6]
- The Global Financial Markets Association(GFMA), which consists of European, Asian and North American financial market associations: The Association for Financial Markets in Europe (AFME) in London and Brussels, the Asia Securities Industry & Financial Markets Association (ASIFMA) in Hong Kong, and the Securities Industry and Financial Markets Association (SIFMA) in New York and Washington DC.

These global financial institutions are investment banks, Insurance companies, or commercial banks, active in the stock-, bond-, foreign exchange-, derivatives- and commodities-markets, investing private equity including mortgages in hedge funds and pension funds, mutual funds, sovereign wealth funds etc. International lobbying firms play a role in international financial systems, as they increasingly develop cross-border lobbying arms to influence international negotiations. For example, Podesta Group, a



Washington lobbying firm, founded “Global Solutions” to influence multilateral free trade agreements, such as the Trans-Pacific Partnership (TPP) and the Transatlantic Trade and Investment Partnership (TTIP), and any other issues “at the intersection of trade, economics, politics and diplomacy”.

Governments

Governments act in various capacities within the GFS, traditionally primarily through their finance ministries. They pass the laws to regulate financial markets, set the tax burden for private sector, e.g., banks, funds and exchanges. At the same time governments also participate in global financial markets through discretionary spending and borrowing. They are closely tied to, though in most countries independent of central banks that issue government debt, set interest rates and deposit requirements, and intervene in the foreign exchange market.

Regional institutions

Examples are:

- Commonwealth of Independent States (CIS)
- Mercosur
- North American Free Trade Agreement (NAFTA)
- Euro zone with its
- ECB or European Central Bank
- EU Department of Internal Market and Services, led by the European Commissioner for Internal Market and Services,^[9] which has produced an expert review of Financial Regulation, the Liikanen report, in 10/2012.
- EBA or European Banking Authority,^[10] which replaced the CEBS or Committee of European Banking Supervisors
- The European Shadow Financial Regulatory Committee (ESFRC).

10.3.2 Foreign Portfolio Investments- Introduction

Foreign Portfolio Investment is the entry of funds into a country where foreigners make purchases in the country's stock and bond markets, sometimes for speculation.

It is a usually short term investment (sometimes less than a year, or with involvement in the management of the company), as opposed to the longer term Foreign Direct Investment partnership (possibly through joint venture), involving transfer of technology and “know-how”. For example, Ford Motor Company may invest in a manufacturing plant in Mexico, yet not be in direct control of its affairs. Foreign Portfolio Investment (FPI): passive holdings of securities and other financial assets, which do NOT entail active management or control of the securities' issuer. FPI is positively influenced by high rates of return and reduction of risk through geographic diversification. The return on FPI is normally in the form of interest payments or non-voting dividends.

Regulations Regarding Portfolio Investments by SEBI Registered Foreign Institutional Investors (FIIs)

- Investment by SEBI registered FIIs is regulated under SEBI (FII) Regulations, 1995 and Regulation 5(2) of FEMA Notification No.20 dated May 3, 2000, as amended from time to time. FIIs include Asset Management Companies, Pension Funds, Mutual Funds, Investment Trusts as Nominee Companies, Incorporated / Institutional Portfolio Managers or their Power of Attorney holders, University Funds, Endowment Foundations, Charitable Trusts and Charitable Societies.
- SEBI acts as the nodal point in the registration of FIIs. The Reserve Bank of India has granted general permission to SEBI Registered FIIs to invest in India under the Portfolio Investment Scheme (PIS).
- Investment by SEBI registered FIIs and its sub accounts cannot exceed 10per cent of the paid up

capital of the Indian company. However, in case of foreign corporate or High Net worth Individuals (HNIs) registered as sub accounts of an FII, their investment shall be restricted to 5 per cent of the paid up capital of the Indian company. All FIIs and their sub-accounts taken together cannot acquire more than 24 per cent of the paid up capital of an Indian Company. An Indian company can raise the 24 per cent ceiling to the sectoral cap / statutory ceiling, as applicable, by passing a resolution by its Board of Directors followed by passing a Special Resolution to that effect by their General Body. The Indian company has to intimate the raising of the FII limit to the Reserve Bank to enable the Bank to notify the same on its website for larger public dissemination.

- SEBI registered FIIs/sub-accounts of FIIs can invest in primary issues of Non-Convertible Debentures (NCDs)/ bonds only if listing of such bonds / NCDs is committed to be done within 15 days of such investment. In case the NCDs/bonds issued to the SEBI registered FIIs / sub-accounts of FIIs are not listed within 15 days of issuance to the SEBI registered FIIs / sub-accounts of FIIs, for any reason, then the FII/sub-account of FII shall immediately dispose of these bonds/NCDs either by way of sale to a third party or to the issuer and the terms of offer to FIIs / sub-accounts should contain a clause that the issuer of such debt securities shall immediately redeem / buyback the said securities from the FIIs/sub-accounts of FIIs in such an eventuality.

Regulations Regarding Portfolio Investments by NRIs/PIOs

- Non- Resident Indian (NRIs) and Persons of Indian Origin (PIOs) can purchase or sell shares/ fully and mandatorily convertible debentures of Indian companies on the Stock Exchanges under the Portfolio Investment Scheme. For this purpose, the NRI/ PIO has to apply to a designated branch of a bank, which deals in Portfolio Investment. All sale/ purchase transactions are to be routed through the designated branch.
- An NRI or a PIO can purchase shares up to 5 per cent of the paid up capital of an Indian company. All NRIs/PIOs taken together cannot purchase more than 10 per cent of the paid up value of the company. This limit can be increased by the Indian company to 24 per cent by passing a General Body resolution. The Indian company has to intimate the raising of the NR Limit to the Reserve Bank to enable the Bank to notify the same on its website for larger public dissemination.
- The sale proceeds of the repatriable investments can be credited to the NRE/ NRO, etc. accounts of the NRI/ PIO, whereas the sale proceeds of non-repatriable investment can be credited only to NRO accounts.
- The sale of shares will be subject to payment of applicable taxes.

10.3.3 Modern Portfolio Theory

Modern Portfolio Theory (MPT) is a theory of finance that attempts to maximize portfolio expected return for a given amount of portfolio risk, or equivalently minimize risk for a given level of expected return, by carefully choosing the proportions of various assets.

MPT is a mathematical formulation of the concept of diversification in investing, with the aim of selecting a collection of investment assets that has collectively lower risk than any individual asset. This is possible, intuitively speaking, because different types of assets often change in value in opposite ways. For example, to the extent prices in the stock market move differently from prices in the bond market, a collection of both types of assets can in theory face lower overall risk than either individually. But diversification lowers risk even if assets' returns are not negatively correlated—indeed, even if they are positively correlated.

More technically, MPT models an asset's return as a normally distributed function (or more generally as an elliptically distributed random variable), defines risk as the standard deviation of return, and models a portfolio as a weighted combination of assets, so that the return of a portfolio is the weighted combination of the assets' returns. By combining different assets whose returns are not perfectly positively correlated, MPT seeks to reduce the total variance of the portfolio return. MPT also assumes that investors are rational and markets are efficient.



Concept

The fundamental concept behind MPT is that the assets in an investment portfolio should not be selected individually, each on their own merits. Rather, it is important to consider how each asset changes in price relative to how every other asset in the portfolio changes in price.

Investing is a tradeoff between risk and expected return. In general, assets with higher expected returns are riskier. For a given amount of risk, MPT describes how to select a portfolio with the highest possible expected return. Or, for a given expected return, MPT explains how to select a portfolio with the lowest possible risk (the targeted expected return cannot be more than the highest-returning available security, of course, unless negative holdings of assets are possible.)^[6]

Therefore, MPT is a form of diversification. Under certain assumptions and for specific quantitative definitions of risk and return, MPT explains how to find the best possible diversification strategy.

Assumptions

The framework of MPT makes many assumptions about investors and markets. Some are explicit in the equations, such as the use of Normal distributions to model returns. Others are implicit, such as the neglect of taxes and transaction fees. None of these assumptions are entirely true, and each of them compromises MPT to some degree.

- **Investors are interested in the optimization problem described above (maximizing the mean for a given variance).** In reality, investors have utility functions that may be sensitive to higher moments of the distribution of the returns. For the investors to use the mean-variance optimization, one must suppose that the combination of utility and returns make the optimization of utility problem similar to the mean-variance optimization problem. A quadratic utility without any assumption about returns is sufficient. Another assumption is to use exponential utility and normal distribution, as discussed below.
- **Asset returns are (jointly) normally distributed random variables.** In fact, it is frequently observed that returns in equity and other markets are not normally distributed. Large swings (3 to 6 standard deviations from the mean) occur in the market far more frequently than the normal distribution assumption would predict. While the model can also be justified by assuming any return distribution that is jointly elliptical, all the joint elliptical distributions are symmetrical whereas asset returns empirically are not.
- **Correlations between assets are fixed and constant forever.** Correlations depend on systemic relationships between the underlying assets, and change when these relationships change. Examples include one country declaring war on another, or a general market crash. During times of financial crisis all assets tend to become positively correlated, because they all move (down) together. In other words, MPT breaks down precisely when investors are most in need of protection from risk.
- **All investors aim to maximize economic utility (in other words, to make as much money as possible, regardless of any other considerations).** This is a key assumption of the efficient market hypothesis, upon which MPT relies.
- **All investors are rational and risk-averse.** This is another assumption of the efficient market hypothesis. In reality, as proven by behavioral economics, market participants are not always rational or consistently rational. The assumption does not account for emotional decisions, stale market information, "herd behavior", or investors who may seek risk for the sake of risk. Casino gamblers clearly pay for risk, and it is possible that some stock traders will pay for risk as well.
- **All investors have access to the same information at the same time.** In fact, real markets contain information asymmetry, insider trading, and those who are simply better informed than others. Moreover, estimating the mean (for instance, there is no consistent estimator of the drift of a

brownian when subsampling between 0 and T) and the covariance matrix of the returns (when the number of assets is of the same order of the number of periods) are difficult statistical tasks.

- **Investors have an accurate conception of possible returns, i.e., the probability beliefs of investors match the true distribution of returns.** A different possibility is that investors' expectations are biased, causing market prices to be informationally inefficient.
- **There are no taxes or transaction costs.** Real financial products are subject both to taxes and transaction costs (such as broker fees), and taking these into account will alter the composition of the optimum portfolio. These assumptions can be relaxed with more complicated versions of the model.
- **All investors are price takers, i.e., their actions do not influence prices.** In reality, sufficiently large sales or purchases of individual assets can shift market prices for that asset and others (via cross elasticity of demand.) An investor may not even be able to assemble the theoretically optimal portfolio if the market moves too much while they are buying the required securities.
- **Any investor can lend and borrow an unlimited amount at the risk free rate of interest.** In reality, every investor has a credit limit.
- **All securities can be divided into parcels of any size.** In reality, fractional shares usually cannot be bought or sold, and some assets have minimum orders sizes.
- **Risk/Volatility of an asset is known in advance/is constant.** In fact, markets often misprice risk (e.g. the US mortgage bubble or the European debt crisis) and volatility changes rapidly.

Mathematical Model

In some sense the mathematical derivation below is MPT, although the basic concepts behind the model have also been very influential.

This section develops the "classic" MPT model. There have been many extensions since.

Risk and Expected Return

MPT assumes that investors are risk adverse, meaning that given two portfolios that offer the same expected return, investors will prefer the less risky one. Thus, an investor will take on increased risk only if compensated by higher expected returns. Conversely, an investor who wants higher expected returns must accept more risk. The exact trade-off will be the same for all investors, but different investors will evaluate the trade-off differently based on individual risk aversion characteristics. The implication is that a rational investor will not invest in a portfolio if a second portfolio exists with a more favorable risk-expected return profile – i.e., if for that level of risk an alternative portfolio exists that has better expected returns.

Note that the theory uses standard deviation of return as a proxy for risk, which is valid if asset returns are jointly normally distributed or otherwise elliptically distributed.

Under the model:

- Portfolio return is the proportion-weighted combination of the constituent assets' returns.
- Portfolio volatility is a function of the correlations ρ_{ij} of the component assets, for all asset pairs (i, j).

In general:

- Expected return:

$$E(R_p) = \sum_i w_i E(R_i)$$

where R_p is the return on the portfolio, R_i is the return on asset i and w_i is the weighting of component asset i (that is, the proportion of asset " i " in the portfolio).

- Portfolio return variance:

$$\sigma_p^2 = \sum_i w_i^2 \sigma_i^2 + \sum_i \sum_{j \neq i} w_i w_j \sigma_i \sigma_j \rho_{ij},$$

where ρ_{ij} is the correlation coefficient between the returns on assets i and j . Alternatively the expression can be written as:

$$\sigma_p^2 = \sum_i \sum_j w_i w_j \sigma_i \sigma_j \rho_{ij},$$

where $\rho_{ij} = 1$ for $i=j$.

- Portfolio return volatility (standard deviation):

$$\sigma_p = \sqrt{\sigma_p^2}$$

For a two asset portfolio:

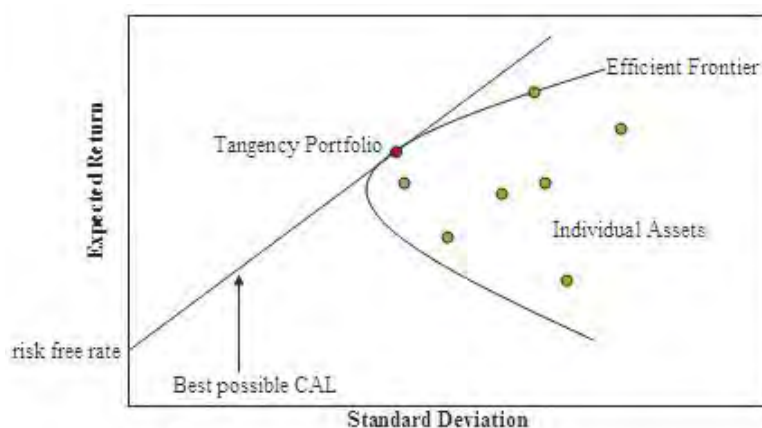
- Portfolio return: $E(R_p) = w_A E(R_A) + w_B E(R_B) = w_A E(R_A) + (1 - w_A) E(R_B)$.
- Portfolio variance: $\sigma_p^2 = w_A^2 \sigma_A^2 + w_B^2 \sigma_B^2 + 2w_A w_B \sigma_A \sigma_B \rho_{AB}$

Diversification

An investor can reduce portfolio risk simply by holding combinations of instruments that are not perfectly positively correlated (correlation coefficient $-1 \leq \rho_{ij} < 1$). In other words, investors can reduce their exposure to individual asset risk by holding a diversified portfolio of assets. Diversification may allow for the same portfolio expected return with reduced risk. These ideas have been started with Markowitz and then reinforced by other economists and mathematicians such as Andrew Brennan who have expressed ideas in the limitation of variance through portfolio theory.

If all the asset pairs have correlations of 0 they are perfectly uncorrelated the portfolio's return variance is the sum over all assets of the square of the fraction held in the asset times the asset's return variance (and the portfolio standard deviation is the square root of this sum).

The Efficient Frontier with no Risk-Free Asset



Efficient Frontier - The hyperbola is sometimes referred to as the 'Markowitz Bullet', and is the efficient frontier if no risk-free asset is available. With a risk-free asset, the straight line is the efficient frontier.

As shown in this graph, every possible combination of the risky assets, without including any holdings of the risk-free asset, can be plotted in risk-expected return space, and the collection of all such possible portfolios defines a region in this space. The left boundary of this region is a hyperbola, and the upper edge of this region is the efficient frontier in the absence of a risk-free asset (sometimes called "the Markowitz bullet"). Combinations along this upper edge represent portfolios (including no holdings of the risk-free asset) for which there is lowest risk for a given level of expected return. Equivalently, a portfolio lying on the efficient frontier represents the combination offering the best possible expected return for given risk level.

Matrices are preferred for calculations of the efficient frontier. In matrix form, for a given "risk tolerance" $q \in [0, \infty)$, the efficient frontier is found by minimizing the following expression:

$$w^T \Sigma w - q * R^T w$$

Where,

- w is a vector of portfolio weights and $\sum_i w_i = 1$. (The weights can be negative, which means investors can short a security.);
- Σ is the covariance matrix for the returns on the assets in the portfolio;
- $q \geq 0$ is a "risk tolerance" factor, where 0 results in the portfolio with minimal risk and ∞ results in the portfolio infinitely far out on the frontier with both expected return and risk unbounded; and
- R is a vector of expected returns.
- $w^T \Sigma w$ is the variance of portfolio return.
- $R^T w$ is the expected return on the portfolio.

The above optimization finds the point on the frontier at which the inverse of the slope of the frontier would be q if portfolio return variance instead of standard deviation were plotted horizontally. The frontier in its entirety is parametric on q .

Many software packages, including MATLAB, Microsoft Excel, Mathematica and R, provide optimization routines suitable for the above problem.

An alternative approach to specifying the efficient frontier is to do so parametrically on the expected portfolio return $R^T w$. This version of the problem requires that we minimize

$$w^T \Sigma w$$

subject to

$$R^T w = \mu$$

for parameter μ . This problem is easily solved using a Lagrange multiplier.

Two Mutual Fund Theorem

One key result of the above analysis is the two mutual fund theorem. This theorem states that any portfolio on the efficient frontier can be generated by holding a combination of any two given portfolios on the frontier; the latter two given portfolios are the "mutual funds" in the theorem's name. So in the absence of a risk-free asset, an investor can achieve any desired efficient portfolio even if all that is accessible is a pair of efficient mutual funds. If the location of the desired portfolio on the frontier is between the locations of the two mutual funds, both mutual funds will be held in positive quantities. If the desired portfolio is outside the range spanned by the two mutual funds, then one of the mutual funds must be



sold short (held in negative quantity) while the size of the investment in the other mutual fund must be greater than the amount available for investment (the excess being funded by the borrowing from the other fund).

Asset Pricing using MPT

The above analysis describes optimal behavior of an individual investor. Asset pricing theory builds on this analysis in the following way. Since everyone holds the risky assets in identical proportions to each other—namely in the proportions given by the tangency portfolio—in market equilibrium the risky assets' prices, and therefore their expected returns, will adjust so that the ratios in the tangency portfolio are the same as the ratios in which the risky assets are supplied to the market. Thus relative supplies will equal relative demands. MPT derives the required expected return for a correctly priced asset in this context.

Systematic Risk and Specific Risk

Specific risk is the risk associated with individual assets - within a portfolio these risks can be reduced through diversification (specific risks "cancel out"). Specific risk is also called diversifiable, unique, unsystematic, or idiosyncratic risk. Systematic risk (a.k.a. portfolio risk or market risk) refers to the risk common to all securities—except for selling short as noted below, systematic risk cannot be diversified away (within one market). Within the market portfolio, asset specific risk will be diversified away to the extent possible. Systematic risk is therefore equated with the risk (standard deviation) of the market portfolio.

Since a security will be purchased only if it improves the risk-expected return characteristics of the market portfolio, the relevant measure of the risk of a security is the risk it adds to the market portfolio, and not its risk in isolation. In this context, the volatility of the asset, and its correlation with the market portfolio, are historically observed and are therefore given. (There are several approaches to asset pricing that attempt to price assets by modeling the stochastic properties of the moments of assets' returns - these are broadly referred to as conditional asset pricing models.)

Systematic risks within one market can be managed through a strategy of using both long and short positions within one portfolio, creating a "market neutral" portfolio.

Capital Asset Pricing Model

The asset return depends on the amount paid for the asset today. The price paid must ensure that the market portfolio's risk / return characteristics improve when the asset is added to it. The CAPM is a model that derives the theoretical required expected return (i.e., discount rate) for an asset in a market, given the risk-free rate available to investors and the risk of the market as a whole.

The CAPM is usually expressed:

$$E(R_i) = R_f + \beta_i(E(R_m) - R_f)$$

- β , Beta, is the measure of asset sensitivity to a movement in the overall market; Beta is usually found via regression on historical data. Betas exceeding one signify more than average "riskiness" in the sense of the asset's contribution to overall portfolio risk; Betas below one indicate a lower than average risk contribution.
- $(E(R_m) - R_f)$ is the market premium, the expected excess return of the market portfolio's expected return over the risk-free rate.

This equation can be statistically estimated using the following regression equation:

$$SCL : R_{i,t} - R_f = \alpha_i + \beta_i (R_{M,t} - R_f) + \epsilon_{i,t}$$

where α_i is called the asset's alpha, β_i is the asset's beta coefficient and SCL is the Security Characteristic Line.

Once an asset's expected return, $E(R_i)$, is calculated using CAPM, the future cash flows of the asset can be discounted to their present value using this rate to establish the correct price for the asset. A riskier stock will have a higher beta and will be discounted at a higher rate; less sensitive stocks will have lower betas and be discounted at a lower rate. In theory, an asset is correctly priced when its observed price is the same as its value calculated using the CAPM derived discount rate. If the observed price is higher than the valuation, then the asset is overvalued; it is undervalued for a too low price.

(1) The incremental impact on risk and expected return when an additional risky asset, **a**, is added to the market portfolio, **m**, follows from the formulae for a two-asset portfolio. These results are used to derive the asset-appropriate discount rate.

- Market portfolio's risk = $(w_m^2 \sigma_m^2 + [w_a^2 \sigma_a^2 + 2w_m w_a \rho_{am} \sigma_a \sigma_m])$

Hence, risk added to portfolio = $[w_a^2 \sigma_a^2 + 2w_m w_a \rho_{am} \sigma_a \sigma_m]$

but since the weight of the asset will be relatively low, $w_a^2 \approx 0$

i.e. additional risk = $[2w_m w_a \rho_{am} \sigma_a \sigma_m]$

- Market portfolio's expected return = $(w_m E(R_m) + [w_a E(R_a)])$

Hence additional expected return = $[w_a E(R_a)]$

(2) If an asset, **a**, is correctly priced, the improvement in its risk-to-expected return ratio achieved by adding it to the market portfolio, **m**, will at least match the gains of spending that money on an increased stake in the market portfolio. The assumption is that the investor will purchase the asset with funds borrowed at the risk-free rate, R_f ; this is rational if $E(R_a) > R_f$.

Thus: $[w_a (E(R_a) - R_f)] / [2w_m w_a \rho_{am} \sigma_a \sigma_m] = [w_a (E(R_m) - R_f)] / [2w_m w_a \sigma_m \sigma_m]$

i.e. : $[E(R_a)] = R_f + [E(R_m) - R_f] * [\rho_{am} \sigma_a \sigma_m] / [\sigma_m \sigma_m]$

i.e. : $[E(R_a)] = R_f + [E(R_m) - R_f] * [\sigma_{am}] / [\sigma_{mm}]$

$[\sigma_{am}] / [\sigma_{mm}]$ is the "beta", β_{return} — the covariance between the asset's return and the market's return divided by the variance of the market return— i.e. the sensitivity of the asset price to movement in the market portfolio's value.

Criticisms

Despite its theoretical importance, critics of MPT question whether it is an ideal investing strategy, because its model of financial markets does not match the real world in many ways.

Efforts to translate the theoretical foundation into a viable portfolio construction algorithm have been plagued by technical difficulties stemming from the instability of the original optimization problem with respect to the available data. Recent research has shown that instabilities of this type disappear when a regularizing constraint or penalty term is incorporated in the optimization procedure.

MPT does not really Model the Market

The risk, return, and correlation measures used by MPT are based on expected values, which means that they are mathematical statements about the future (the expected value of returns is explicit in the above equations, and implicit in the definitions of variance and covariance). In practice, investors must substitute predictions based on historical measurements of asset return and volatility for these values



in the equations. Very often such expected values fail to take account of new circumstances that did not exist when the historical data were generated.

More fundamentally, investors are stuck with estimating key parameters from past market data because MPT attempts to model risk in terms of the likelihood of losses, but says nothing about why those losses might occur. The risk measurements used are probabilistic in nature, not structural. This is a major difference as compared to many engineering approaches to risk management.

Options theory and MPT have at least one important conceptual difference from the probabilistic risk assessment done by nuclear power [plants]. A PRA is what economists would call a structural model. The components of a system and their relationships are modeled in Monte Carlo simulations. If valve X fails, it causes a loss of back pressure on pump Y, causing a drop in flow to vessel Z, and so on.

But in the Black–Scholes equation and MPT, there is no attempt to explain an underlying structure to price changes. Various outcomes are simply given probabilities. And, unlike the PRA, if there is no history of a particular system-level event like a liquidity crisis, there is no way to compute the odds of it. If nuclear engineers ran risk management this way, they would never be able to compute the odds of a meltdown at a particular plant until several similar events occurred in the same reactor design.

Essentially, the mathematics of MPT views the markets as a collection of dice. By examining past market data we can develop hypotheses about how the dice are weighted, but this isn't helpful if the markets are actually dependent upon a much bigger and more complicated chaotic system—the world. For this reason, accurate structural models of real financial markets are unlikely to be forthcoming because they would essentially be structural models of the entire world. Nonetheless there is growing awareness of the concept of systemic risk in financial markets, which should lead to more sophisticated market models.

Mathematical risk measurements are also useful only to the degree that they reflect investors' true concerns—there is no point minimizing a variable that nobody cares about in practice. MPT uses the mathematical concept of variance to quantify risk, and this might be justified under the assumption of elliptically distributed returns such as normally distributed returns, but for general return distributions other risk measures (like coherent risk measures) might better reflect investors' true preferences.

In particular, variance is a symmetric measure that counts abnormally high returns as just as risky as abnormally low returns. Some would argue that, in reality, investors are only concerned about losses, and do not care about the dispersion or tightness of above-average returns. According to this view, our intuitive concept of risk is fundamentally asymmetric in nature.

MPT does not account for the personal, environmental, strategic, or social dimensions of investment decisions. It only attempts to maximize risk-adjusted returns, without regard to other consequences. In a narrow sense, its complete reliance on asset prices makes it vulnerable to all the standard market failures such as those arising from information asymmetry, externalities, and public goods. It also rewards corporate fraud and dishonest accounting. More broadly, a firm may have strategic or social goals that shape its investment decisions, and an individual investor might have personal goals. In either case, information other than historical returns is relevant.

Behavioral Asset Pricing Model

Behavioral Portfolio Theory, as defined by Sherfrin and Statman in 1999, presents the idea that investors build portfolios as “pyramids of assets.” Each layer in the pyramid (e.g., emergency funds, investment portfolio, qualified retirement funds, etc.) carries different attitudes toward risk. This is completely different than the Markowitz model (CAPM), which is based on consistent attitudes toward risk. Based on this early work in behavioral finance, Shefrin and Statman recently developed the BAPM, in order to improve upon CAPM. The following table represents the major differences between CAPM and BAPM. In order to fully appreciate these differences, the next several pages will compare and contrast standard finance to behavioral finance.

	Characteristics of CAPM	Characteristics of BAPM
Model Premise	Presence of Markowitz-based information traders who have specific mean-variance preferences and do not commit cognitive errors.	Market interaction between information traders and noise traders, who do not have mean-variance preferences and do commit cognitive errors.
Expected Returns	Determined by standard betas, measures of systematic risk those are determined with respect to the market portfolio.	Determined by behavioral betas, measures of risk with respect to the mean-variance-efficient portfolio. This portfolio differs from the Markowitz market portfolio and depends on the preferences of the noise traders (e.g., whether growth or value stocks are currently favored).
Beta	Standard betas are difficult to determine because selecting an approximate proxy for the market portfolio is difficult.	Behavioral betas are difficult to determine because the preferences of the noise traders can change over time.
Supply & Demand for Stock	Determined by standard beta, which is utilitarian in nature.	Determined by the behavioral beta, which is both utilitarian and value-expressive.

Behavioral Finance

Collectively, consumers tend to make some very strange choices when it comes to how they make purchases and manage their money. Similarly, investors in financial markets also tend to think as a group and make irrational decisions. It is almost uncanny how an event can trigger so many market participants to unconsciously react in the same ways.

Behavioral finance is a response to this strange behavior. The theory attempts to explain how investors process events and formulate decisions. Theoretically, understanding behavioral finance allows other investors to predict market movements and profit from them.

While consumers tend to make a lot of the same mistakes investors do, there is a definite focus among financial behaviorists on the psychology of investing in particular. This is most likely due to the widespread fascination with the activity of financial markets. In the future, this focus may shift, allowing advances in the science to also help consumers learn from their mistakes and make better financial decisions.

In addition to sometimes making poor decisions, consumers and investors have a tendency to follow each other into precarious financial situations. Behavioral finance theorists try to track the foolish decisions they make, as well as their impact on markets as a whole. They can use this information to either help guide investors into making sounder decisions when investing in the stock market, or to profit themselves.

These concepts may contradict the efficient market hypothesis, and may not really give investors the opportunity to profit from subsequent market movements, but they can still help guide investors into making better investing decisions.

Below is a crash course in behavioral finance and how it can work for you.

Foundations of Behavioral Finance

In the classical era, both Adam Smith and Jeremy Bentham wrote detailed observations on the implications of the psychology of money. Many researchers lost interest in the idea of using psychology in finance until the second half of the 1900s, when there was more evidence to support it.

Behaviorists and financial theorists alike have started to research the topic more fully in recent years. They are trying to understand how people think when they make investment decisions, and what models they can construct to use this information to their own advantage. Kahneman's paper "Prospect Theory:



Decision Making Under Risk" is probably one of the most significant in modern times.

Earlier studies were more empirical. They conducted observations on key events and measured responses both on the individual and group level. Modern theorists have gone to additional lengths and actually started doing neuro-mapping to identify parts of the brain that may be responsible for key decisions.

One interesting conclusion that many researchers have proposed is that investors often make decisions that are clearly unlikely to help them make more money or keep the wealth they already have. As counterintuitive as this may seem, there is actually a lot of evidence to support it.

To better understand where these theories and conclusions come from, let's take a look at some of the findings in the field of behavioral finance.

Observations in Behavioral Finance

Researchers have made a number of interesting observations in this field over the years. They've thoroughly documented each and proposed that the following can be used as indicators of future behavior.

- 1. Investors are more motivated by the fear of loss than the rewards of successful investing.** Investors put their money into assets so that they can make money. Interestingly, once they've invested the fear of losing their money seems predominate in their minds. Investors will often hold onto a losing asset out of pride. Even when the asset continues to decline in value, they refuse to admit they made a poor investing decision and cling to it, hoping they can get their money back. This usually won't happen and they end up incurring even greater losses.
- 2. People believe what they want to believe.** People have a tendency to ignore bad investment news and analysis, even when their money is at stake. The insanity escalates when they utilize completely useless and irrelevant information to support the decision they want to make. Successful investors know to look at things objectively and refrain from being overly optimistic when making a decision.
- 3. Investors are often overconfident when they have small amounts of information.** Rationally, you would assume that investors would be less confident when less information was available to them. Unfortunately, they have historically been easily assured by good news. When the stock market performed well, they believed that it was possible to make a lot of money with little work. Hopefully, with recent events, this trend has changed a little. However, when the stock market recovers, this bias will probably become evident once again.
- 4. All dollars are not treated equally.** Most people would think that a dollar is a dollar no matter how you spin it. According to some theories and observations, this isn't the case. People actually tend to place more value on a penny they've earned than three they could save. Also, money that is received through inheritances is often spent more frugally than money that the beneficiary would otherwise work hard for. Wise people manage their money the same regardless of where it comes from. They also work just as hard at saving money in taxes as they do earning it.
- 5. Detailed descriptions have greater influence on investors than boring, but more relevant facts.** People are often more influenced by a five page report with fancy graphics than a set of hard data. The few pieces of data may be more relevant and beneficial in making a decision, but lengthy and engaging reports seem to have a stronger effect on many people. This is even the case when they aren't looking for something specific, or have no preconceptions about what they are looking for.
- 6. Consumers have a hard time making decisions with lots of choices.** Even when they are purchasing almost identical products at similar prices, consumers are often paralyzed when it comes to making a decision. Many times, they make random choices rather than evaluate the products to make an informed decision.

7. **Using an arbitrary or irrelevant metric to assign value.** Investors and consumers frequently come up with a random way to determine the value of a security or good. This concept is referred to as anchoring. One example is when investors look at the high and low price of a security for a year and assume that the security is always going to be trading in that price range. If it is trading on the low side, they will buy the security with the expectation that it will increase in value. Of course, it can always move into new low territory (and often does), leaving investors with a significant loss. Another example is when parents obligate themselves to spend 15% of their December income on Christmas gifts, resulting in the purchase of frivolous gifts their children won't want. As bizarre as it sounds, some parents actually hold themselves to these hard and fast rules.
8. **Mental accounting.** This is when people divide their money up into different accounts based on subjective reasons. They may have an account to save up for the next summer vacation, one for Christmas gifts, and one for their children's college education. This strategy may help them feel more organized, but it can lead to inflexible financial planning and the reluctance to transfer money from a low yielding account to a more lucrative one.
9. **Gambler's fallacy.** Humans tend to be overconfident and completely illogical when predicting random, future events. One mistake they make is thinking that past events have any connection to future events. For example, if someone flips a coin twice and it turns up tails each time, they are probably more likely to bet that the coin will be heads next. They assume that the law of averages works out, failing to consider that the coin is just as likely to turn up as heads the next time around. This is how many people view trading strategies that are based on random price movements. It also accounts for the difficult time people have profiting from technical analysis trading strategies and the doubts many financial professionals have about technical analysis itself. They claim that the market has no memory and that attempts to predict it based off of prior price movements is an exercise in futility. There is a good chance they are right.
10. **Placing more emphasis on recent events rather than considering all events together.** People assume that recent and relevant events go hand in hand. This is true to an extent, but in many cases the rationale doesn't make any sense. You will find that investors will often look at the most current report from a group of analysts who all had access to the same information and assume that it is the correct one. They fail to look at the fact that all the analysts before them looked at the same data, over the same time frame, but came up with different results. It is almost as if the events or studies that came before were statistically insignificant and didn't merit being included in the sample.
11. **Pressure to conform to others' beliefs.** People go with the flow and make the same mistakes that everyone else around them make. This is either due to a need for acceptance or the inability to accept that large groups can possibly be wrong.

These are some of the most commonly recorded phenomena in behavioral finance. They have been observed over periods of decades or centuries. Behaviorists and financial researchers are constantly looking for more subtle and benign examples of how psychology impacts financial decisions, and how we can use this information to our advantage.

Now that you understand the patterns that support the theory, how can it be applied? Fortunately, this research can easily be used to inform real life decisions.

Applications of the Behavioral Finance Theory

There are several ways that financial advisors and individuals can use the lessons of behavioral finance to their advantage:

1. **Learning to recognize mistakes.** As mentioned above, there are a number of mistakes that investors and consumers make time and time again. Understanding behavioral finance allows them to notice their mistakes and rectify them. For example, I noticed when I was buying a car recently, that I wasn't too motivated to negotiate the price down, even though I could have easily gotten



a hundred dollars off of the sale price. Afterward, I was kicking myself thinking how hard I would have to work to get that \$100 and how easy it would have been to get that money off the ticket price. I clearly placed more value on the money I would have earned than saved. Other investors might realize that they constantly make decisions based on limited knowledge. After they are made aware of this common heuristic, they may notice it in themselves and take steps to fix it.

2. **Understanding and adapting to other people's decision making processes.** In addition to recognizing people's mistakes, it is sometimes important just to understand people and the way they think. It is ideal for money managers to understand their client's behavior so that they can give them better advice. In confrontational situations (such as legal settlements), many professionals will play to the other party's weaknesses using behavioral finance in order to ensure that they get the better end of the settlement. This is commonly referred to as game theory.
3. **Evaluating market trends.** Behavioral finance is the concept behind understanding markets trends, because these trends are the basis for how people make financial decisions. One application is through the use of technical analysis, which involves using charts and graphs to predict future price movements. The principle behind technical analysis is that humans rely on both conscious and subconscious patterns when investing. Those patterns can be followed and used to predict other future behavior.
4. **Facilitating the planning process.** Forecasters are able to predict significant variables such as the number of units of a particular product they are likely to sell under a given set of circumstances. This is key to understanding financial models. Many forecasters find their numbers are off because they erroneously assumed that consumers or investors would behave in a rational manner. Predicting how consumers and investors will behave rather than how they *should* behave will lead to more accurate forecasts and models.
5. **Impacts of events on the market.** Typically, following long standing trends (such as price patterns over the course of a month or more) is a popular idea among trenders and technical analysts, but financial planners can track security prices based on onetime events as well. Human beings are expected to reach a certain way after an event and this information can be used to their advantage.
6. **Promoting products to consumers.** In a lot of ways, behavioral finance overlaps with marketing. They both rely on the psychology of individuals and groups, and how it can be influenced through strategically influencing others. While it could be considered unethical, companies regularly study the decision-making errors of consumers to find out how they can be exploited to convince consumers to purchase their products.

Keep in mind that some of these concepts contradict the efficient market hypothesis, which should not necessarily be completely discounted. There is evidence to suggest that concepts such as technical analysis are valid trading tools. They are based off of the logical concept that human beings tend to follow behavioral patterns not always obvious to the majority of investors. Therefore, it may still be possible to profit from them.

Additional Resources on Behavioral Finance

If you'd like to learn more about behavioral finance, you're in luck. There have been a lot of great books and papers written on the subject in recent years. The topic is so complex that it is impossible to summarize all the theories and ideas in a blog article or even an entire blog devoted to the topic. The works of Adam Smith and Jeremy Bentham helped found the field, but they are older articles that don't serve consumers or investors as well as more recent research. Here are some resources you may want to look at:

1. **BehaviouralFinance.net.** This blog is completely dedicated to the topic of behavioral finance. It attempts to discuss everything relevant to behavioral finance and does a great job doing so.

2. **The Courage of Misguided Convictions.** Brad Barber wrote an excellent paper on the trading strategies of individual investors and how they relate to us.
3. **The Disposition Effect of Securities Trading.** Based on empirical studies of securities trading, this paper focuses on the tendency of investors to hold onto losing assets and sell those that have made the most money.
4. **The Disposition Effect and Momentum.** This paper illustrates the phenomenon of investors continuing to invest in securities that have performed well or dumping those that have done very poorly. The effect of this practice is that the security continues to move in the same direction.

These resources should help you learn more about the psychology behind financial decisions and how you may be able to use them to your advantage when investing.

Final Word

Professionals have been researching the field of behavioral finance for years. It has given new insight that can change the way we participate in markets and better understand consumers. Studying the psychology of consumers and investors can be a great way to both observe investing opportunities, and correct investing mistakes. It is something that should be researched carefully.

Supporters of the efficient market hypothesis may not believe in all strategies behind behavioral finance, but at the very least, you can use these principles to notice your own errors and do what you can to fix them. If you are interested in learning more about the mistakes that investors and consumers make, try checking out some of the papers that academics and researchers have written. You may be surprised by the errors you make yourself.

Issues in Behavioral Finance

The central issue in behavioral finance is explaining why market participants make systematic errors. Such errors affect prices and returns, creating market inefficiencies. It also investigates how other participants take advantage (arbitrage) of such market inefficiencies.

Behavioral finance highlights inefficiencies such as under- or over-reactions to information as causes of market trends (and in extreme cases of bubbles and crashes). Such reactions have been attributed to limited investor attention, overconfidence, over optimism, mimicry (herding instinct) and noise trading. Technical analysts consider behavioral finance, behavioral economics' academic cousin, to be the theoretical basis for technical analysis.

Other key observations include the asymmetry between decisions to acquire or keep resources, known as the "bird in the bush" paradox, and loss aversion, the unwillingness to let go of a valued possession. Loss aversion appears to manifest itself in investor behavior as a reluctance to sell shares or other equity, if doing so would result in a nominal loss. It may also help explain why housing prices rarely/slowly decline to market clearing levels during periods of low demand.

Benartzi and Thaler (1995), applying a version of prospect theory, claim to have solved the equity premium puzzle, something conventional finance models have been unable to do so far. Experimental finance applies the experimental method, e.g., creating an artificial market by some kind of simulation software to study people's decision-making process and behavior in financial markets.

Quantitative Behavioral Finance

Quantitative behavioral finance uses mathematical and statistical methodology to understand behavioral biases. In marketing research, a study shows little evidence that escalating biases impact marketing decisions.

Financial Models

Some financial models used in money management and asset valuation incorporate behavioral finance parameters, for example:



- Thaler's model of price reactions to information, with three phases, under reaction-adjustment-overreaction, creating a price trend

One characteristic of overreaction is that average returns following announcements of good news is lower than following bad news. In other words, overreaction occurs if the market reacts too strongly or for too long to news, thus requiring adjustment in the opposite direction. As a result, outperforming assets in one period are likely to underperform in the following period.

- The stock image coefficient

Criticisms

Critics such as Eugene Fama typically support the efficient-market hypothesis. They contend that behavioral finance is more a collection of anomalies than a true branch of finance and that these anomalies are either quickly priced out of the market or explained by appealing to market microstructure arguments. However, individual cognitive biases are distinct from social biases; the former can be averaged out by the market, while the other can create positive feedback loops that drive the market further and further from a "fair price" equilibrium. Similarly, for an anomaly to violate market efficiency, an investor must be able to trade against it and earn abnormal profits; this is not the case for many anomalies.

A specific example of this criticism appears in some explanations of the equity premium puzzle. It is argued that the cause is entry barriers (both practical and psychological) and that returns between stocks and bonds should equalize as electronic resources open up the stock market to more traders. In reply, others contend that most personal investment funds are managed through superannuation funds, minimizing the effect of these putative entry barriers. In addition, professional investors and fund managers seem to hold more bonds than one would expect given return differentials.

Behavioral Game Theory

Behavioral game theory is a subject that analyzes interactive strategic decisions and behavior using the methods of game theory, experimental economics, and experimental psychology. Experiments include testing deviations from typical simplifications of economic theory such as the independence axiom and neglect of altruism, fairness, and framing effects. On the positive side, the method has been applied to interactive learning and social preferences. As a research program, the subject is a development of the last three decades.

Behavioral Portfolio Theory (BPT) was published by Shefrin and Statman. This theory essentially tries to provide a contrast to the fact that the ultimate motivation for investors is the maximization of the value of their portfolios. It suggests that investors have varied aims and create an investment portfolio that meets a broad range of goals. It does not follow the same principles as the Capital Asset Pricing Model, Modern Portfolio Theory and the Arbitrage Pricing Theory. A behavioral portfolio bears a strong resemblance to a pyramid with distinct layers. Each layer has well defined goals. The base layer is devised in a way that it is meant to prevent financial disaster, whereas, the upper layer is devised to attempt to maximize returns, an attempt to provide a shot at becoming rich.

BPT is a descriptive theory based on the SP/A theory of Lola Lopez (1987), and closely related to Roy's safety-first criterion. The theory is described as a single account version: BPT-SA, which is very closely related to the SP/A theory.

10.3.4 Foreign Portfolio Trends in India- Emerging Trends, Issue and Policy Developments

With the opening up of its economy under the structural adjustment program since 1991, there has been a significant shift in several policies and programs of the Indian government. This shift is more pronounced in the arena of capital flows, from earlier policy regime of official and commercial borrowings to private capital flows - in the form of foreign direct investment (FDI) and portfolio investment (PI). Since then, various measures have been undertaken to open Indians economy to foreign investment and earlier restrictions have been relaxed. There is no doubt that in the post-1991 period FDI flows in India have

increased, but the growth in portfolio investment has been more dramatic. In 1993-94 and 1994-95, the portfolio inflows outnumbered the FDI, contributing over 70 per cent of the total capital inflows during this period. This trend continued until 1997. It was only in the wake of Asian financial crisis in 1997, which enhanced emerging market risk perception among the foreign investors, that the PI suffered decline in comparison with the FDI in India.

Unlike Chile and Japan, India did not follow the "Big Bang" approach of financial deregulation and liberalization. But, the content of financial liberalization in India is similar - deregulation, privatization, and pro-market oriented policies. Given the fact that Indian financial markets are fragmented and even not integrated domestically, the critics argue that the rapid global integration of financial markets seems to be too early and premature. In 1992, the Indian government began the process of integration of its financial markets with global finance capital in two major ways. Firstly, by permitting foreign institutional investors to enter its capital markets and secondly, by allowing domestic companies to raise capital from abroad through the issuance of equity, Global Depository Receipts (GDRs), and other debt instruments.

In recent years, emerging market economies (EMEs) are increasingly becoming a source of foreign investment for rest of the world. It is not only a sign of their increasing participation in the global economy but also of their increasing competence. More importantly, a growing impetus for change today is coming from developing countries and economies in transition, where a number of private as well as state-owned enterprises are increasingly undertaking outward expansion through foreign direct investments (FDI). Companies are expanding their business operations by investing overseas with a view to acquiring a regional and global reach.

A. Factors Providing Momentum to Outward Foreign Investments

- (i) According to UNCTAD's World Investment Report 2011, the stock of outward FDI from developing economies reached US\$ 3.1 trillion in 2010 (15.3 per cent of global outward FDI stock), up from US\$ 857 billion (10.8 per cent of global outward FDI stock) 10 years ago. On flow basis, outward FDI from developing economies has grown from US\$ 122 billion in 2005 to US\$ 328 billion in 2010 accounting for around a quarter of total outward FDI witnessed at global level.
- (ii) FDI is a natural extension of globalisation process that often begins with exports. In the process, countries try to access markets or resources and gradually reduce the cost of production and transaction by expanding overseas manufacturing operations in countries where certain ownership-specific advantages can help them to compete globally. Adoption of such strategies helps them to catch up with competing economies.
- (iii) A significant uptrend in outward FDI has also been observed in the case of India in recent years. Since globalisation is a two-way process, integration of the Indian economy with the rest of the world is evident not only in terms of higher level of FDI inflows but also in terms of increasing level of FDI outflows.
- (iv) The overseas investment of domestic corporate sector through FDI has provided them better access to global networks and markets, transfer of technology and skills and also enables them to share research and development efforts and outcomes. It can also be seen as a corporate strategy to promote the brand image and utilisation of raw materials available in the host country. In the Indian context, overseas investments have been primarily driven by either resource seeking or market seeking or technology seeking motives. Of late, there has been a surge in resource seeking overseas investments by Indian companies, especially to acquire energy resources in Australia, Indonesia and Africa.
- (v) It is against this background that I intend to speak on recent trends and emerging issues in relation to Indian outward FDI. I am thankful to Bombay Chamber of Commerce for choosing this topical subject for today's discussion. In my presentation, I would briefly talk about the evolution of outward FDI policy in India, trends and analysis of outward FDI, funding pattern



of outward FDI, measures taken by the Reserve Bank of India and Government of India, emerging issues and end with some thoughts on way forward.

B. Evolution of Outward Foreign Investment Policy in India

- (i) Change in policy environment across the economies has greatly influenced the outward investment pattern in the global economy. Nonetheless, recognising the concerns of capital outflows, governments in different countries, particularly emerging and developing economies, have been relatively more circumspect on undertaking policy liberalisation of outward investment. Therefore, it is important to highlight how the Indian policy in this regard has evolved over time.
- (ii) In the Indian context, overseas investments in joint ventures (JV) and wholly owned subsidiaries (WOS) have been recognised as important channels for promoting global business by the Indian entrepreneurs. The broad approach has been to facilitate outward foreign direct investment through joint ventures and wholly owned subsidiaries and provision of financial support to promote exports including project exports from India. With a steady rise in capital inflows, particularly in the second half of 2000s, the overall foreign exchange reserve position provided comfort to progressive relaxation of the capital controls and simplification of the procedures for outbound investments from India. Three distinct overlapping phases as under can be discerned in the evolution of the Indian outward FDI policies.

Phase I (1992 to 1995): Period of Liberalization of Indian economy

Guidelines on outward FDI were in place before the process of liberalization and globalisation of Indian economy in 1991-92. Policy changes since 1992 were undertaken keeping in view the changing needs of a growing economy. Understandably, the rules were quite restrictive and subject to conditions of no cash remittance and mandatory repatriation of dividend from the profits from the overseas projects. In 1992, the 'automatic route' for overseas investments was introduced and cash remittances were allowed for the first time. Nonetheless, the total value was restricted to US\$ 2 million with a cash component not exceeding US\$ 0.5 million in a block of 3 years.

Phase II (1995 to 2000): Creation of a Fast Track Route

In 1995, a comprehensive policy framework was laid down and the work relating to approvals for overseas investment was transferred from Ministry of Commerce to the Reserve Bank of India to provide a single window clearance mechanism. The policy framework articulated a cohesive approach that was flexible enough to respond to likely future trends. It reflected the need for transparency, recognition of global developments, capturing of Indian realities and learning of lessons from the past. The basic objectives of the policy, *inter alia*, was to ensure that such outflows, were determined by commercial interests but were also consistent with the macroeconomic and balance of payment compulsions of the country, particularly in terms of the magnitude of the capital flows. In terms of the overseas investment policy, a fast track route was adopted where the limits were raised from US\$ 2 million to US\$ 4 million and linked to average export earnings of the preceding three years. Cash remittance continued to be restricted to US\$ 0.5 million. Beyond US\$ 4 million, approvals were considered under the 'Normal Route' approved by a Special Committee comprising the senior representatives of the Reserve Bank of India (Chairman) and the Ministries of Finance, External Affairs and Commerce (members). Investment proposals in excess of US\$ 15 million were considered by the Ministry of Finance with the recommendations of the Special Committee and were generally approved if the required resources were raised through the global depository route (GDR) route.

In March 1997, exchange earners, other than exporters, were also brought under the fast track route. Indian promoters were allowed to set up second and subsequent generation companies, provided the first generation company was set up under the Fast Track Route. A series of measures to encourage the software industry in India to expand capacity, reduce costs, improve quality and

also invest abroad were put in place. As part of the reforms process preceding the introduction of FEMA, the neutrality condition attached to the Overseas Direct Investment was done away with in 1999. The scope for outward FDI, however, expanded significantly after the introduction of the Foreign Exchange Management Act (FEMA) in June 2000.

Phase III (2000 till date): Liberalized framework under FEMA

In 2002, the per annum upper limit for automatic approval was raised to US\$100 million. Such upper limit was, however, discontinued when the automatic route for outward FDI was further liberalised in March 2003 to enable Indian parties to invest to the extent of 100 per cent of their net worth. Since then the limit of outward FDI has been gradually increased to 400 per cent. The ceiling of 400 per cent of net worth, however, is not applicable for

- (a) investments made out of balances held in the Exchange Earners' Foreign Currency (EEFC) account of the Indian party or out of funds raised abroad through ADRs/GDRs.
- (b) Indian companies engaged in the energy and natural resources sectors, such as, oil, gas, coal and mineral ores, though they would require prior approval of the Reserve Bank of India.
- (iii) Overseas investments in unincorporated entities in oil sector (e.g. by way of taking up participation interest) by Navaratna Public Sector Undertakings were allowed under the automatic route and subsequently the facility was extended to other Indian entities as well. Further, in 2004, the External Commercial Borrowing policy was modified and funding of JVs/WOS abroad was included as a permissible end-use of the funds raised.
- (iv) At present, any Indian party can make overseas direct investment in any *bona-fide* activity except certain real estate activities {i.e., buying and selling of real estate or trading in Transferable Development Rights (TDRs)} and banking business (which are considered by an inter-Ministerial group) that are specifically prohibited. For undertaking activities in the financial services sector, certain conditions as specified by the Reserve Bank, however, need to be adhered to. Access to international financial markets was also progressively liberalised for the Indian corporate sector and they were allowed to use special purpose vehicles (SPVs) in international capital markets to finance their cross-border acquisitions. The impact of policy liberalisation is now reflected in cross-border acquisitions by Indian corporate growing at an accelerated pace.

C. Funding Pattern of Outward FDI

- (i) As far as policy regarding the funding of overseas investments is concerned, it is allowed in a number of ways. These sources mainly include (i) purchase of foreign exchange on-shore from an authorised dealer in India, (ii) capitalisation of foreign currency proceeds to be received from the foreign entity on account of exports, fees, royalties or any other dues from the foreign entity for supply of technical know-how, consultancy, managerial and other services, (iii) swapping of shares of Indian entity with those of overseas entity, (iv) use of balances held in the Exchange Earners' Foreign Currency (EEFC) accounts of Indian entity maintained with an authorised dealer, (v) foreign currency proceeds through ECBs/FCCBs, and (vi) exchange of ADRs/GDRs issued in accordance with the scheme for issue of Foreign Currency Convertible Bonds.
- (ii) A recent study by Virtus Global Partners (April 2011) based on US bound Indian investments has confirmed that internal accruals were the major financing option used by Indian companies in 2010. It also found that half of Indian acquisitions in the US in 2009 and 2010 were buyouts of distressed assets, whose parent companies were severely impacted by the global crisis. Seizing these opportunities in overseas markets, many acquisition/investment deals (e.g. S Kumar - Hartmax, Cadila's - Novavax, Piramal - RxElite, and 3i - NRLB, etc.) were struck by Indian companies during 2009.



(iii) Role of Indian banks

Although normally banks in India are not permitted to fund the equity contributions of the promoters, financial assistance to Indian companies by the domestic banks for acquisition of equity in overseas joint ventures/wholly owned subsidiaries or in other overseas companies, new or existing, as strategic investment has been permitted. Such policy should include overall limit on such financing, terms and conditions of eligibility of borrowers, security, margin, etc. While the Board of the bank may frame its own guidelines and safeguards for such lending, such acquisition(s) should be beneficial to the company and the country.

- (iv)** In order to facilitate such financial support of Indian business abroad, the Reserve Bank has enhanced the prudential limit on credit and non-credit facilities extended by banks to Indian Joint Ventures (where the holding by the Indian company is more than 51 per cent) / Wholly Owned Subsidiaries abroad from the existing limit of 10 per cent to 20 per cent of their unimpaired capital funds (Tier I and Tier II capital). Banks in India were also allowed in May 10, 2007 to extend funded and / or non-funded credit facilities to wholly owned step-down subsidiaries of subsidiaries of Indian companies (where the holding by the Indian company is 51 per cent or more) abroad. Banks, however, have to, among others, ensure that the JV/ WOS is located in a country which has no restriction on obtaining such foreign currency loan or repatriation of loan/interest and they can create legal charge on overseas securities/ assets securing such exposures.

(v) Role of the Exim Bank

Exim Bank has been involved in supporting Indian direct investment overseas since its inception and its role has been unique in this regard, given its mandate. The Overseas Investment Finance (OIF) programme of Exim Bank seeks to cover the entire cycle of Indian investment overseas including the financing requirements of Indian Joint Ventures (JV) and Wholly Owned Subsidiaries (WOS) with a suite of financing instruments, which include (a) finance for Indian company's equity participation, (b) direct finance to the overseas JVs/WOS, (c) finance for acquisition of overseas business/companies including leveraged buyouts and (d) direct equity investment. As on December 31, 2011, Exim Bank has approved credit aggregating to 240.92 billion for 374 ventures set-up by over 298 companies in 69 countries.

(vi) Role of Export Credit Guarantee Corporation of India Limited (ECGC)

While some of the overseas acquisitions have been hugely successful, some investments have been fully written off within a short span of time. There are a number of reasons for failure but the inability to withstand adverse changes in the operating economic and regulatory environment has been the most predominant one. This is a pointer to the need for adequate risk mitigants in the process of investments abroad.

- (vii)** In 1980, ECGC introduced the Overseas Investment Insurance scheme. Since inception of the scheme, only 61 insurance covers with an aggregate value of ₹ 5.73 billion have been issued. One plausible explanation given for the low popularity of the scheme is the perception that the cost of insurance cover is high (which is between one to 2.5 per cent per annum depending on country and tenure of investment). It is, however, important to realize the spectrum of coverage the scheme offers by providing insurance coverage to investments against political risks including war, expropriation and foreign exchange repatriation restrictions. Thus, the Indian companies who intend to make investments in politically vulnerable countries would benefit from such insurance covers more than those having investments in developed countries.

(viii) SPV route for leveraged buy outs

Existing WOSs/JVs or SPVs are being used to fund acquisitions through leverage buyout route which reduces the risk on the domestic balance sheet. A substantial portion of investment

has taken place through the SPVs set up for the purpose abroad. The funding is often arranged through overseas banks backed either by shares or assets of the target company and/or guarantees by the Indian parent. So far companies have largely used a mix of their retained earnings (internal source) and borrowings (external source) to finance their overseas acquisition. This is in quite contrast to what is generally seen in the context of many other countries' cross-border M&As where share swapping is a popular option of financing. Share swaps have not yet emerged as a favored payment option in India except in a few large transactions in the software industry. During the post-reform period, Indian capital market has been significantly liberalised. As a result, the market capitalisation of stocks of Indian companies has also substantially improved over the years. This, in turn, seems to have facilitated greater access to overseas capital markets for financing their overseas investments. Further, sustained growth in corporate earnings has improved the profitability and strengthened the balance sheets of Indian companies which also helped them to undertake cross-border acquisitions through internal resources.

D. Measures taken by the Reserve Bank of India

- (i) The liberalisation of the overseas investment policy since the year 2003 has been substantial, given the improvement in macro fundamentals, and bias towards calibrated relaxation of the policy towards capital account rules. Commensurate with the build-up of the foreign exchange reserves of the country, there has been a larger opening up of the overseas direct investment avenues resulting in the enhancement in the quantum of overseas direct investment to 400 per cent of the net worth as mentioned earlier. Similarly, the aggregate ceiling for overseas investment by mutual funds, registered with SEBI, was enhanced from US\$ 4 billion to US\$ 5 billion in September 2007. This was further raised to US\$ 7 billion in April 2008. Apart from raising the financial limits, the Reserve Bank has also automated the entire process of allocation of Unique Identification Number (UIN). The automation through a web based application has enabled efficient processing which has reduced the time taken for processing the applications and also improved the management information system.
- (ii) It may thus be observed that keeping in view the changes in the business environment across the world, Reserve Bank has been proactive in aligning the policies relating to foreign exchange transactions to suit the dynamic business environment (Exhibit 1). In June 2011, the Reserve Bank allowed Indian parties to disinvest their stake abroad without prior approval, where the amount repatriated on disinvestment is less than the amount of the original investment, subject to certain conditions. Since July 2011, the Reserve Bank has been disseminating the data in respect of outward FDI on a monthly basis.
- (iii) Registered trusts and societies engaged in the manufacturing/ education/ hospital sectors have since been permitted to establish JV/WOS engaged in these sectors with prior approval. Further, proprietary/unregistered partnership firm (recognized star export house with proven track record) are permitted to set up JV/WOS abroad with prior approval from Reserve Bank.
- (iv) Further, considering the need for allowing individuals to benefit from the liberalized FEMA framework as a valuable adjunct to India's globalization efforts as also recognising the fact that economies were getting coupled, the overseas investment policy was modified to allow individuals to acquire shares under the ESOP scheme by removing the existing monetary ceilings, allotment of shares of foreign entities on account of professional services rendered and a general permission to acquire foreign securities as qualification/rights shares was also accorded.

F. Measures taken by Government of India

Recognizing the need for promoting overseas investments, the Government of India has drafted strategic plans aimed at supporting smaller players. The Department of Industrial Policy and Promotion (DIPP) has identified South East Asia, Eastern Europe and Africa as zones where Indian



companies would be encouraged to acquire assets as well as buy-out of companies. Also, in 2011, the Government of India approved a policy to support raw material asset purchases made by select public sector undertakings (PSUs) abroad. Under the revised policy, the investment limit for 'Navratna' firms has been raised to ₹ 30 billion from ₹ 10 billion for any asset buy-out and for the 'Maharatna' firms, the limit has been set at ₹ 50 billion. Government approval would be needed for any additional amount beyond this limit. PSUs in agriculture, mining, manufacturing and electricity sectors having a three-year record of making net profits are eligible under this policy. The Ministry of External Affairs and Indian missions abroad would be associated right from the beginning of the process for a buyout. The government is currently evaluating proposals to facilitate acquisition of strategic assets, particularly the energy sector, through a special investment vehicle or through cash rich PSUs in the field.

G. Emerging issues in outward FDI

(i) Use and abuse of multi-layered structure

One contentious issue which needs to be addressed for providing a transparent policy framework for outward FDI relates to multi-layered structures. The motivations range from genuine business/commercial considerations to taxation benefits which are available to any global investors. On the flip side at times the underlying motive could be to create opacity through a labyrinth of structures for reasons unjustified on business grounds or from the point of view of home country's interest. Hence, there is a need to have a greater clarity in our approach in this regard.

(ii) Controlled Foreign Companies under Direct Tax Code

To incentivize the overseas investments, in the last Union Budget, Government had announced a 50 per cent reduction in the tax rate in respect of dividend inflows from JV/WOS. Taxation in respect of overseas investments under the 'Controlled Foreign Companies' (CFC) norm of the proposed Direct Tax Code (DTC) would have implications for Indian outward FDI. It may, however, take a few years before we come to any definitive conclusions on their implications after DTC is introduced.

(iii) Impact on current account deficit

The build-up in the foreign exchange reserves had supported the initiatives of liberalisation of many of the capital controls including the outward FDI from India. India being a current account deficit (CAD) economy, there is a need to closely monitor the capital outflows going from the country. We need surplus on capital account to finance India's growing current account deficit and also have to keep the level of foreign exchange reserves at a comfortable level given several demands on the reserves. Therefore, unlimited capital outflows for outward FDI could have significant implications for sustainability of India's CAD and external debt profile.

(iv) Impact on domestic investments

- (a) Another important factor that warrants close monitoring of capital outflows is implication for domestic investment. It needs to be ensured that overseas investment by Indian companies do not crowd-out domestic investments. Even though both domestic capital formation and overseas FDI investments have increased concomitantly in recent years, potential implications of rising trend in outward FDI for domestic investment, growth and employment need to be examined against the benefits that domestic companies derive elsewhere in terms of expanded market base, backward and forward vertical integration and cheap skilled labour.
- (b) In a globalised business environment, establishing an overseas presence becomes inevitable on account of a country's policy on outsourcing, emphasis on on-shore

presence, protectionism, etc. Hence, the Indian companies have to balance the need for domestic business expansion with the compulsions of overseas investments.

(v) Likely impact of devolvement of contingent liabilities

It has been observed that in the recent years, the non-fund exposure in the form of guarantees issued by Indian companies towards their JVs/WOS has been rising. Given the uncertain global environment, exponential rise in issuance of guarantees could be a potential concern for banks (who often provide back to back guarantees) and the Indian companies concerned.

(vi) Impact of economic downturn of foreign economies

Another important aspect that has to be borne in mind is that the overseas business model could go awry due to a variety of reasons, such as, sudden downward trend of the economy as experienced during the recent global financial crisis and the Euro zone sovereign debt crisis. Such events may adversely impact the financials of the Indian companies with a spill-over effect on the domestic corporates and banking sectors. During the periods of global crisis, Indian companies may face challenges to their overseas investments. This would be on account of moderation in internal accruals and also due to the funding constraints that maybe faced by Indian JVs/WOS arising out of faced by the multinational investment banks and financing institutions. Indian corporates who had acquired overseas assets at much higher premium in a bullish phase of business cycle or did not undertake intensive due diligence before such acquisitions in anticipation of future growth, potentially risk huge valuation loss during the downturn.

(vii) Ensuring security through strategic acquisitions

The emerging economies are becoming increasingly conscious of ensuring security in the fields of energy, commodity and food for the future generations. This has led to a spate of strategic acquisitions in the recent past, notable among them being acquisition of coal mines, oil fields etc. Proposals for acquisition of overseas assets, particularly in the energy sector through special purpose fund or through the PSUs in the related field are now being discussed for long term strategic benefit of the country. Various options of funding are also being debated. Given the nature of our foreign exchange reserves, which have not been built out of surplus, strains visible on the external sector and various other demands being placed on the reserves, funding of such ventures out of reserves does not seem a viable option. The other alternatives including overseas borrowing against sovereign backing or domestic resource raising through special cess and utilization of private sector resources in a PPP model need to be evaluated for this purpose.

(viii) Investments by individuals & LLPs

Today, we have an enabling regulatory environment for encouraging overseas investments by individuals. We, however, need to examine the existing caps and link it to the monetary ceilings applicable under the Liberalized Remittance Scheme (LRS) (remittance of US\$ 200,000 for permitted current and capital account transactions). Some of the ceilings which may require rationalization include ceiling to acquire qualification shares and shares of a foreign entity in part/full consideration of professional services rendered to the foreign company or in lieu of Director's remuneration, to acquire shares offered through an ESOP scheme globally, on uniform basis, in a foreign company which has an equity stake, directly or indirectly, in the Indian company. The Reserve Bank of India in consultation with the Ministries concerned has since decided to

- (a) remove the existing cap of one per cent on the ceiling for resident individuals to acquire qualification shares and to link the same to the monetary ceiling under the LRS;



- (b) to grant general permission to resident individuals to acquire shares of a foreign entity in part/full consideration of professional services rendered to the foreign company or in lieu of Director's remuneration with monetary ceiling as per the limit prescribed under LRS; and
 - (c) to grant general permission to Indian resident employees or Directors to acquire shares through an ESOP scheme globally on uniform basis in a foreign company which has an equity stake, directly or indirectly, in the Indian company.
- (ix) Issues relating to allowing individuals to set-up JVs/WOS abroad under a transparent policy framework within the LRS ceiling are also being examined.
- (x) The extant regulations allow registered partnership firms to invest abroad. With the passing of the LLP Act, there is a need to review the regulation and examine if LLPs can also be permitted to invest in JV/WOS abroad.

(xi) Approach towards multi-layered structures

In the context of multi layered structures, taxation remains a contentious issue and a subject of debate. This issue, euphemistically, referred to as "Treaty Shopping" or "Tax planning" or "Tax Avoidance", has implications for outbound FDI. We need to have clearer policy prescriptions on the issue after considering the legal/business requirements of the various jurisdictions before embarking on any policy that may either facilitate or restrict such investment motives. Reserve Bank in consultation with the government and all the stakeholders would like to examine the issues involved in a holistic manner.

(xii) Risks from global business cycles

Success of outward investment projects would also depend on the business cycles in the global economy. An outward FDI project undertaken during upswing phase of business cycle may not remain viable during downward phase. For instance, MNCs operating in sectors, viz., automobiles, metals and chemicals proved to be quite sensitive to adverse shocks of recent global crisis (UNCTAD, 2009). Hence, even though direct investment is generally undertaken with lasting interest in the host economy, companies need to recognise the degree of sensitivity of their business activity to the global business cycle as well.

ILLUSTRATION

Illustration 31.**Cost of Irredeemable Debentures:**

Borrower Ltd. issued 10,000, 10% Debentures of ₹100 each on 1st April. The cost of issue was ₹ 25,000. The Company's tax rate is 35%. Determine the cost of debentures if they were issued (a) at par (b) at a premium of 10% and (c) at a discount of 10%

Solution:

Particulars	Par (₹)	Premium (₹)	Discount (₹)
Gross Proceeds	10,000×100=10,00,000	10,000×110=11,00,000	10,000×90=9,00,000
Proceeds			
Less: Cost of Issue	25,000	25,000	25,000
Net Proceeds	9,75,000	10,75,000	8,75,000
Interest at 10%	1,00,000	1,00,000	1,00,000
Less: Tax at 35%	35,000	35,000	35,000
Net Outflow	65,000	65,000	65,000
$K_d = \frac{\text{Interest (after tax)}}{\text{Net Proceeds}}$	6.67%	6.05%	7.43%

Illustration 32.**Cost of Redeemable Debentures**

Indebted Ltd issued 10,000, 10% Debentures of ₹100 each, redeemable in 10 years time at 10% premium. the cost of issue was ₹25,000. The Company's Income Tax Rate is 35%. Determine the cost of debentures if they were issued (a) at par (b) at a premium of 10% and (c) at a discount of 10%.

Solution:

(Amount in ₹)

	Particulars	Par	Premium	Discount
1.	Gross Proceeds	10,000×100 10,00,000	10,000×110 11,00,000	10,000×90 9,00,000
2.	Cost of Issue	25,000	25,000	25,000
3.	Net Proceeds (NP) (1-2)	9,75,000	10,75,000	8,75,000
4.	Redemption Value (RV) (Face Value+10% premium)	11,00,000	11,00,000	11,00,000
5.	Average Liability (RV+NP) ÷ 2 = (4+3) ÷ 2	10,37,500	10,87,500	9,87,500
6.	Premium on Redemption = RV – NP	1,25,000	25,000	2,25,000
7.	Average Premium on Redemption p.a. = (6) ÷ 10 yrs.	12,500	2,500	22,500
8.	Interest payable at 10% of Face Value	1,00,000	1,00,000	1,00,000
9.	After Tax Interest at 65% (Since Tax=35%)	65,000	65,000	65,000
10.	Average Annual Payout = (7+9)	77,500	67,500	87,500
11.	$K_d = \frac{\text{Interest (after tax) + Average Premium on Redeemable Debentures}}{\text{Average Liability}}$	7.47%	6.21%	8.86%

Note: Cost of Debt will not be equal to the Interest Rate on Debt. This is due to the following reasons—

(d) Tax-Saving Effect:

(e) Issue at Premium/Discount:



- (f) Expenses of Issue and difference between Face Value and Net Proceeds;
 (g) Redemption at premium and additional amount payable.

Illustration 33.

Alternative Modes of Debt

A company is considering raising funds of about ₹100 Lakhs by one of two alternative methods, viz. 14% Substitutional Term Loan and 13% Non-Convertible Debentures. The term loan option would attract no major accidental cost. The Debentures would be issued at a discount of 2.5% and would involve cost of issue ₹1 lakh. Advise the company as to the better option based on effective cost of capital. Assume a tax rate of 50%.

Solution :

(₹ in Lakhs)

Mode	Term Loan	Debentures
Gross Realisation	100.00	100×97.5%=97.50
Less: Cost of Issue	—	1.00
Net Proceeds	100.00	96.50
Interest Payable at 14% and 13% of Face Value	14.00	13.00
Interest × After tax rate=Annual Payout	7.00	6.50
Effective K_d Interest (after tax) + Net Proceeds	7%	6.74%
Ranking	II	I

Note : Based on Effective K_d , Debentures can be preferred. But net realisation is only ₹96.5 Lakhs. If fund requirement of ₹100 Lakhs is considered as the base, the Face Value of Debentures to be issued. [₹100 Lakhs (Net Proceeds) + ₹1 Lakh (Cost of Issue)] ÷ 97.5% (issued at a discount). Hence, Face Value of Debentures issued ₹103.59 Lakhs approximately. Effective Cost of Debentures in that case = **6.73%**.

Illustration 34.

Cost of Irredeemable Preference Shares

Preferred Ltd. issued 30,000, 15% Preference Shares of ₹100 each. The cost of issue was ₹30,000. Determine the cost of Preference Capital if shares are issued (a) at par (b) at a premium of 10% and (c) at a discount of 10%.

Solution :

(Amount in ₹)

Particular	Par	Premium	Discount
Gross Proceeds	30,000×100=30,00,000	30,000×110=33,00,000	30,000×90=27,00,000
Less: Cost of Issue	30,000	30,000	30,000
Net Proceeds	29,70,000	32,70,000	26,70,000
Preference Dividend 15%	4,50,000	4,50,000	4,50,000
$K_p = \frac{\text{Preference Dividend}}{\text{Net Proceeds}}$	15.15%	13.76%	16.85%

Illustration 35.

Cost of Redeemable Preference Shares.

Preferential Ltd. issued 30,000, 15% Preference Shares of ₹100 each, redeemable at 10% premium after 20 years ₹ Issue Management Expenses were ₹30,00. Find out of Preference Capital if shares are issued (a) at par (b) at a premium of 10% and (c) at a discount of 10%.

Solution :

	Particulars	Par	Premium	Discount
1.	Gross Proceeds (30,000 Shares × Issue Price)	30,00,000	33,00,000	27,00,000
2.	Cost of Issue	30,000	30,000	30,000
3.	Net Proceeds (NP) = (1–2)	29,70,000	32,70,000	26,70,000
4.	Redemption Value (RV) (Face Value+10% premium)	33,00,000	33,00,000	33,00,000
5.	Average Liability (RV+NP) ÷ 2 = (4+3) ÷ 2	31,35,000	32,85,000	29,85,000
6.	Premium on Redemption = RV – NP	3,30,000	30,000	6,30,000
7.	Avg Premium on Redemption p.a. ÷ 20 yrs.	16,500	1,500	31,500
8.	Dividend at 15% of Face Value	4,50,000	4,50,000	4,50,000
9.	Average Annual Payout = (7+8)	4,66,500	4,51,500	4,81,500
10.	$K_p = 9:5$	14.88%	13.74%	16.13%

Illustration 36.**Cost of Equity — Dividend Price Approach**

Dividend-Payers Ltd. has a stable income and stable dividend policy. The average annual dividend payout is ₹ 27 per share (Face Value=₹100). You are required to find out–

- (1) Cost of Equity Capital if Market Price in Year 1 is ₹150.
- (2) Expected Market Price in Year 2 if cost of equity is expected to rise to 20%
- (3) Dividend Payout in Year 2 if the Company were to have an expected market price of ₹160 per share, at the existing cost of equity.

Solution :

1. $K_e = \frac{\text{Dividend per Share}}{\text{Market Price per Share}} = \frac{₹ 27}{₹ 150} = 18\%$
2. $K_e = \frac{\text{Dividend per Share}}{\text{Market Price per Share}} = \frac{₹ 27}{\text{MPS}} = 20\%$, On substitution, MPS=₹ 27÷20% = ₹ **135**
3. $K_e = \frac{\text{Dividend per Share}}{\text{Market Price per Share}} = \frac{\text{DPS}}{₹ 160} = 18\%$, On substitution, DPS= ₹ 160×18%= ₹ **135**.

Illustration 37.**Cost of Equity — E/P Approach**

Easy-Earnes Ltd has a uniform income that accrues in a four-year business cycle. It has an average EPS of ₹ 25 (per share of ₹100) over its business cycle. You are required to find out–

1. Cost of Equity Capital if Market Price in Year 1 is ₹150.
2. Expected Market Price in Year 2 if cost of Equity is expected to rise to 18%
3. EPS in Year 2 if the Company were to have an expected Market Price of ₹160 per share, at the existing cost Equity.

Solution :

1. $K_e = \frac{\text{Earning per Share}}{\text{Market Price per Share}} = \frac{₹ 25}{₹ 150} = 16.67\%$
2. $K_e = \frac{\text{Earning per Share}}{\text{Market Price per Share}} = \frac{₹ 25}{\text{MPS}} = 28\%$ On substitution, MPS=₹ 25÷18%= ₹ **13.89**



Note : Earnings accrue evenly and hence EPS is uniform at ₹25 per share.

$$3. \quad K_e = \frac{\text{Earning per Share}}{\text{Market Price per Share}} = \frac{\text{DPS}}{\text{₹ 160}} = 16.67\% \text{ On substitution, DPS} = ₹160 \times 16.67\% = ₹135.$$

Illustration 38.

Computation of EPS, Cost of Equity and Cost of Debt

The following is an extract from the Financial Statements of KPN Ltd. (in ₹Lakhs)

Operating Profit	105
Less: Interest on Debentures	33
Net Operating Income before Tax	72
Less: Income tax	36
Net Profit after Tax	36
Equity Share Capital (Shares of ₹10 each)	200
Reserves and Surplus	100
15% Non-Convertible Debentures (of ₹100 each)	220
Total	520

Market Price per Equity Share is ₹12 and per Debentur is ₹93.75

What is the Earnings per Share?

What is the percentage cos of capital to the Company for the Debenture Funds and the Equity?

Solution :

$$S = \frac{\text{Earning After Tax}}{\text{No. of Equity Shares}} = \frac{\text{₹ 36 Lakhs}}{20 \text{ Lakhs Shares}} = ₹1.80$$

$$S = \frac{\text{Earning per Share}}{\text{Market per Share}} = \frac{\text{₹ 1.80}}{\text{₹ 12.00}} = ₹15\%$$

Cost of Debt K_d may be computed as under—

	Particulars	Book Value	Market Value
Cost		₹33.00 Lakhs	₹33.00 Lakhs
Invest after tax of 50%		₹16.50 Lakhs	
Share of Debentures		₹220.00 Lakhs	(220/100×93.85) ₹206.25 Lakhs
$K_d = \text{After Tax Interest} \div \text{Value of Deb.}$	7.5%	7.5%	8%

Illustration 39.

Cost of Equity — Growth Approach

Optimistic Ltd has an EPS of ₹90 per Share. Its Dividend Payout Ratio is 40%. Its Earnings and Dividends are expected to grow at 5% per annum. Find out the cost of Equity Capital if its Market Price is ₹360 per share.

Futuristic Ltd pays a Dividend of ₹2 per share. Its shares are quoted at ₹40 presently and investors expect a growth rate of 10% per annum. Calculate—

(i) Cost of Equity Capital

- (ii) Expected Market Price per share if anticipated growth rate is 11%.
 (iii) Market price if dividend is ₹2, cost of capital is 16% and growth rate is 10%.

Solution :**Optimistic Ltd.**

$$(i) K_e = \frac{\text{Dividend per Share}}{\text{Market price per Share}} + g(\text{Growth Rate}) = \frac{\text{₹ } 90 \times 40\%}{\text{₹ } 360} + 5\% = 10\% + 5\% = 15\%$$

Futuristic Ltd.

$$K_e = \frac{\text{Dividend per Share}}{\text{Market price per Share}} + g(\text{Growth}) = \frac{\text{₹ } 2}{\text{₹ } 40} + 10\% = 5\% + 10\% = 15\%$$

$$(ii) K_e = \frac{\text{Dividend per Share}}{\text{Market price per Share}} + g. \quad \text{It is given that } K_e = 15\% = \frac{\text{₹ } 2}{\text{MPS}} + 11\%$$

$$\text{On transposing, we have, } \frac{\text{₹ } 2}{\text{MPS}} = 15\% - 11\% = 4\%. \quad \text{So, MPS} = \text{₹ } 2 \div 4\% = \text{₹ } 50 \text{ per Share.}$$

$$(iii) K_e = \frac{\text{Dividend per Share}}{\text{Market price per Share}} + g. \quad \text{It is given that } K_e = 16\% = \frac{\text{₹ } 2}{\text{MPS}} + 10\%$$

$$\text{On transposing, we have, } \frac{\text{₹ } 2}{\text{MPS}} = 16\% - 10\% = 6\% \text{ So, MPS} = \text{₹ } 2 \div 6\% = \text{₹ } 33 \text{ per Share.}$$

Illustration 40.**Computation of WACC**

- (a) The Capital Structure of All-Good Ltd is — Equity Capital ₹5 Lakhs; Reserves and Surplus ₹2 Lakhs and Debentures ₹3 Lakhs. The Cost of Capital before Tax are – (a) Equity – 18% and (b) Debentures – 10%. You are required to compute the Weighted Cost of Capital, assuming a tax rate of 35%.
- (b) From the following information, compute WACC of Super-Good Ltd. (Assume Tax=35%)
- Debt to Total Funds: 2:5
 - Preference Capital to Equity Capital: 1:1
 - Preference Dividend Rate: 15%
 - Interest on Debentures: ₹20000 for half-year.
 - EBIT at 30% of Capital Employed: ₹3 Lakhs
 - Cost of Equity Capital is 24%.
- (c) Backwaork Ltd has a Debt Equity Ratio of 2:1 and a WACC of 12%. Its Debentures bear interest of 15%. Find out the cost of Equity Capital. (Assume Tax=35%)

Solution: (a) WACC of All Good Ltd

Component	Amount (₹)	%	Individual Cost in %	WACC
Debentures	3,00,000	30%	$K_d = \text{Interest} \times (100\% - \text{Tax Rate})$ $= 10\% \times (100\% - 35\%) = 6.5\%$	1.95
Equity	5,00,000	50%	$K_e = 18\%$	9.00%
Reserves	2,00,000	20%	$K_r = K_e = 18\%$	3.60%
Total	10,00,000		$K_o =$	14.55%

Note: Reserve are taken at same rate as Equity.

**(b) Super Good Ltd.**

EBIT at 30% of Capital Employed = ₹3 Lakhs, Capital Employed = ₹ 3 Lakhs 30% = ₹**10,00,000**.

Debt to Total Funds = 2:5. Hence, Debt = 2/5th of ₹ 10,00,000 = ₹ 4,00,000

Shareholders' Funds = balance 3/5th of ₹10,00,000 = ₹ 6,00,000

Preference to Equity Capital = 1:1 (i.e.equal). The total of both = ₹ 6,00,000

So, Preference Capital = Equity Capital = 1/2 of ₹6,00,000 = ₹ 3,00,000 each.

Interest on Debt = ₹ 20,000 × 2 = ₹ 40,000. Hence Interest Rate = ₹ 40,000 Equ ₹ 4,00,000 = **10%** .

WACC is computed as under—

	Component	Amount (₹)	%	Indivitual Cost in %	WACC%
Debt		4,00,000	40%	$K_d = \text{Interest} \times (100\% - \text{Tax Rate})$ $= 10\% \times (100\% - 35\%) = 6.5\%$	2.60%
Preference		3,00,000	30%	$K_p = 15\%$	4.50%
Equity		3,00,000	30%	$K_e = 24\%$	7.20%
	Total	10,00,000		$K_o =$	14.30%

(c) Computation of Cost of Equity of Backwork Ltd.

Component	%	Indivitual Cost in %	WACC%
Debt	2/3 rd	$K_d = \text{Interest} \times (100\% - \text{Tax Rate})$ $= 15\% \times (100\% - 35\%) = 9.75\%$	$9.75\% \times 2/3^{\text{rd}} = 6.50\%$
Equity	1/3 rd	$K_e = 5.50 / 1/3^{\text{rd}} = \mathbf{16.50\%}$ (final balancing figure)	$12\% - 6.5\% = \mathbf{5.50\%}$ (bal.figure)
	Total		$K_o = (\text{given}) 12.00\%$

Illustration 41.**WACC - Book Value & Market Value Proportions – with/without tax.**

The following information has been extracted from the Balance Sheet of ABC Ltd.as on 31stDecember -

Component of capital	Equity Share Capital	12% Debentures	18%Term Loan	Total
Amount ₹In Lakhs	400	400	1,200	2,000

- Determine the WACC of the Company. It had been paying dividends at a consistent rate of 20% per annum.
- What difference will it make if the current price of the ₹ 100 share is ₹160?
- Determine the effect of Income Tax on WACC under both the above situations. (Tax Rate = 40%).

Solution:**1. Computation of WACC (based on Book Value Proportions and ignoring Tax)**

Component(a)	Proportion(b)	Indivitual Cost (c)	WACC (d) = (b) × (c)
Equity Share Capital	4/20	$K_e = 20\%$ (Dividend Approach)	4.00%
12% Debentures	4/20	$K_d = 12\%$	2.40%
18% Term Loan	12/20	$K_d = 18\%$	10.80%
		WACC = K_o	17.20%

Note:

1. K_e = Dividend per Share **Equa** Market Price per share = ₹ 20.
2. Book Value Proportions have been considered in Column (b) above.

2. (a) Computation of WACC (based on Book Value Proportions and ignoring tax)

Component (a)	Proportion (b)	Individual Cost (c)	WACC (d) = (b)×(c)
Equity Share Capital	4/20	$K_e = 20 \div 160 = 12.50\%$	3.57%
12% Debentures	4/20	$K_d = 12\%$	2.40%
18% Term Loan	12/20	$K_d = 18\%$	10.80%
Total ₹ 2,240 Lakhs		WACC = K_0	15.70%

2. (b) Computation of WACC (based on Market Value Proportions and ignoring tax)

Component (a)	Proportion (b)	Individual Cost (c)	WACC (d) = (b)×(c)
Equity Capital ₹640 Lakhs	64/224	$K_e = 20 \div 160 = 12.50\%$	3.57%
12% Debentures ₹400 Lakhs	40/224	$K_d = 12\%$	2.14%
18% Term Loan ₹1,200 Lakhs	120/224	$K_d = 18\%$	9.64%
Total ₹ 2,240 Lakhs		WACC = K_0	15.35%

3. Effect of Tax Rate of 35% on WACC**(a) Computation of WACC with tax (Situation 1 above based on Book Value Proportions)**

Component (a)	Proportion (b)	Individual Cost (c)	WACC (d) = (b)×(c)
Equity Share Capital	4/20	$K_e = 20\%$	4.00%
12% Debentures	4/20	$K_d = 12\% \times 60\% = 7.20\%$	1.44%
18% Term Loan	12/20	$K_d = 18\% \times 60\% = 10.80\%$	6.48%
		WACC = K_0	11.92%

The WACC has reduced from **17.20%** to **11.92%**, due to tax saving effect.

(b) Computation of WACC with tax (Situation 2 (a) above based on Book Value Proportions)

Component (a)	Proportion (b)	Individual Cost (c)	WACC (d) = (b)×(c)
Equity Share Capital	4/20	$K_e = 20 \div 160 = 12.50\%$	2.50%
12% Debentures	4/20	$K_d = 12\% \times 60\% = 7.20\%$	1.44%
18% Term Loan	12/20	$K_d = 18\% \times 60\% = 10.80\%$	6.48%
		WACC = K_0	10.42%

The WACC has reduced from **15.70%** to **10.42%**, due to tax saving effect.

(c) Computation of WACC with tax (Situation 2(b) above based on Book Value Proportions)

Component (a)	Proportion (b)	Individual Cost (c)	WACC (d) = (b)×(c)
Equity Capital ₹640 Lakhs	64/224	$K_e = 20 \div 160 = 12.50\%$	3.57%
12% Debentures ₹400 Lakhs	40/224	$K_d = 12\% \times 60\% = 7.20\%$	1.29%
18% Term Loan ₹1,200 Lakhs	120/224	$K_d = 18\% \times 60\% = 10.80\%$	5.780%
Total ₹ 2,240 Lakhs		WACC = K_0	10.64%

The WACC has reduced from **15.35%** to **10.64%**, due to tax saving effect.



Illustration 42.

WACC – Financing Decision of Projects

Z Co. has a capital structure of 30% debt and 70% equity. The company is considering various investment proposals costing less than ₹30 Lakhs. The company does not want to disturb its present capital structure. The cost raising the debt and equity are as follows:

Project Cost	Cost of Debt	Cost of Equity
Above ₹5 Lakhs	9%	13%
Above ₹5 Lakhs and upto ₹20 Lakhs	10%	14%
Above ₹20 Lakhs and upto ₹40 Lakhs	11%	15%
Above ₹40 Lakhs and upto ₹1 Crore	12%	15.55%

Assuming the tax rate is 50%, compute the cost of two projects A and B, whose fund requirements are ₹8 Lakhs and ₹22 Lakhs respectively. If the project are expected to yield after tax return of 11%, determine under what conditions it would be acceptable.

Solution:

Particulars	K_d (Debt)%	K_e (Equity) %	WACC = K_0
% of Debt and Equity	30%	70%	
Upto ₹ 5 Lakhs	$9 \times 50\% = 4.5\%$	13%	$4.5 \times 30\% + 13 \times 70\%$
Above ₹ 5 Lakhs to 20 Lakhs	$10 \times 50\% = 5.0\%$	14%	$5.0 \times 30\% + 14 \times 70\% = 11.30\%$
Above ₹ 20 Lakhs to 40 Lakhs	$11 \times 50\% = 5.5\%$	15%	$5.5 \times 30\% + 15 \times 70\% = 12.15\%$
Above ₹ 40 Lakhs to 1 Crore	$12 \times 50\% = 6.0\%$	15.55%	$6.0 \times 30\% + 15.55 \times 70\% = 12.69\%$

Project	Investment	WACC	Return	Decision
A	₹8.00 Lakhs	11.3% (₹5L to ₹20L)	11%	ROI < WACC
B	₹22.00 Lakhs	12.15% (₹20L to ₹40L)	11%	ROI < WACC

Decision: If ROI 11%, Project is acceptable only if

- Project Investment is less than ₹5 Lakhs.
- Fractional Investment is possible on a divisible project — Investment is less than ₹5 Lakhs.

Illustration 43.

Financing Decision and EPS Maximisation

A Company requires ₹15 Lakhs for the installation of a new unit, which would yield an annual EBIT of ₹ 2,50,000. The Company's objective is to maximise EPS. It is considering the possibility of Issuing Equity Shares plus raising a debt of ₹3,00,000, ₹6,00,000 and ₹9,00,000. The current Market Price per Share is ₹50 which is expected to upto ₹40 per share if the market borrowings were to exceed ₹7,00,000. The cost of borrowing are indicated as follows:

Level of Borrowing	Upto ₹2,00,000	₹2,00,000 to ₹6,00,000	₹6,00,000 to ₹9,00,000
Cost of Borrowing	12% p.a.	15% p.a.	17% p.a.

Assuming a tax rate of 50%, work out the EPS and the scheme, which you would recommended to the Company.

Solution: Statement showing EPS under the different schemes

(Amount in ₹)

Particulars	Scheme I	Scheme II	Scheme III
Capital Required	15,00,000	15,00,000	15,00,000
Less : Debt Content	3,00,000	6,00,000	9,00,000
Balance Equity Capital required	12,00,000	9,00,000	6,00,000
Market Price per Share	₹50	₹50	₹40
Number of Equity Shares to be issued (Equity Capital MPS)	24,000	18,000	15,000

Profitability Statement

EBIT	2,50,000	2,50,000	2,50,000
Less: Interest on Debt			
First ₹2,00,000 at 12%	24,000	24,000	24,000
Next ₹4,00,000 at 15%	15,000	60,000	60,000
Balance at 17%			51,000
Total Interest	39,000	84,000	1,35,000
EBIT	2,11,000	1,66,000	1,15,000
Less : Tax at 50%	1,05,500	83,000	57,500
EAT	1,05,500	83,000	57,500
Earning Per Share (EPS) = EAT ÷ No. of shares	4.40%	4.61%	3.83%
Average Interest Rate = Total Interest ÷ Debt	12%	14%	15%
ROCE = EBIT ÷ Capital Employed	16.67%	16.67%	16.67%

Conclusion: EPS is maximum under Scheme II and is hence preferable.

Leverage Effect: Use of Debt Funds and Financial Leverage will have a favourable effect only if ROCE > Interest rate. ROCE is 16.67% and hence upto 15% interest rate, i.e. Scheme II, use of debt will have favourable impact on EPS and ROE. However, when interest rate is higher at 17%, financial leverage will have negative impact and hence EPS falls from ₹4.61 to ₹3.83.

Illustration 44.**WACC and Marginal WACC Computation**

XYZ Ltd. (in 40% Tax bracket) has the following book value capital structure —

Equity Capital (in shares of ₹10 each, fully paid-up at par)	₹15 Crores
11% Preference Capital (in shares of ₹100 each, fully paid-up at par)	₹1 Crore
Retained Earnings	₹20 Crores
13.5% Debentures (of ₹100 each)	₹10 Crores
15% Term Loans	₹12.5 Crores

The next expected dividend on Equity Shares is ₹3.60 per share. Dividends are expected to grow at 7% and the Market price per share is ₹40.

- Preference Shares, redeemable after ten years, is currently selling at ₹75 per share.
- Debentures, redeemable after 6 years, are selling at ₹80 per debenture.

Required:

1. Compute the present WACC using (a) Book Value Proportions and (b) Market Value Proportions.



2. Compute the wighted Marginal Cost of Capital if the Company raises ₹10 Crores next year, given the following information—
- The amount will be raised by equity and debt in equal proportions.
 - The Company expects to retain ₹1.5 Crores earnings next year.
 - The additional issue of Equity Shares will result in the net price per share being fixed at ₹32.
 - The Debt capital raised by way to Term Loans will cost 15% for the first ₹2.5 Crores and 16% for the next ₹2.5 Crores.

Solution :

1. Computation of Cost of Equity under Dividend Approach

Present Cos of Equity under Dividend Approach :

$$K_e = \frac{\text{Dividend per Share}}{\text{Market Price per Share}} + g (\text{Growth Rate}) = \frac{\text{₹ } 3.60}{\text{₹ } 40.00} + 7\% = 9\% + 7\% = 16.00\%$$

Revised Cost of Equity under Dividend Approach :

$$K_e = \frac{\text{Dividend per Share}}{\text{Market Price per Share}} + g (\text{Growth Rate}) = \frac{\text{₹ } 3.60}{\text{₹ } 32.00} + 7\% = 11.25\% + 7\% = 18.25\%$$

2. Computation of Cost of Preference Share Capital

$$\frac{\text{Preference Dividend} + (\text{RV} - \text{Net P}ROceeds) \div N}{(\text{RV} + \text{Net Proceeds}) \div 2} = \frac{[11 + (100 - 75) \div 10]}{[100 + 70] \div 2} = 15.43\%$$

3. Computation of Cost of Debt

Present Costs of Debentures

$$\frac{\text{Preference Dividend} + (\text{RV} - \text{Net P}ROceeds) \div N}{(\text{RV} + \text{Net Proceeds}) \div 2} = \frac{[13.5 \times 60\% + (100 - 80) \div 6]}{[100 + 80] \div 2} = 12.70\%$$

Present Cost of Term Loans = K_d = Interest (100%—Tax Rate) = 15% × (100%—40%) = **9.00%**.

Cost of Additional Debt for first ₹2.50 Crores=Interest (100%—Tax Rate) = 15%×60%=**9.00%**

Cos fo Additional Debt for next ₹2.50 Crores=Interest (100%—Tax Rate)=16%×60%=**9.60%**.

4. Computation of Present WACC base on Book Value Proportions

Particulars	Amount	Proportion	Individual Cost	WACC
Equity Capital	₹15 Crores	15/58.5	WN 1 = 16.00%	4.10%
Preference Capital	₹1 Crore	1/58.5	WN 2 = 15.43%	0.26%
Earnings	₹20 Crores	20/58.5	WN 1 = 16.00%	5.47%
Debentures	₹10 Crores	10/58.5	WN 3 = 12.70%	2.17%
Loans	₹12.05 Crores	12.5/58.5	WN 3 = 9.00%	1.92%
Total	₹58.5 Crores	100%		K_0 = 13.92%

5. Computation of Present WACC base on Market Value Proportions

Particulars	Amount	Proportion	Individual Cost	WACC
Equity Capital	₹60 Crores	60/81.25	WN 1 = 16.00%	11.82%
Preference Capital	₹0.7 Crore	0.75/81.25	WN 2 = 15.43%	0.14%
Gained Earnings	Included in Market Value of Equity Share Capital, hence note applicable			
Debentures	₹8 Crores	8/81.25	WN 3 = 12.70%	1.25%
Loans	₹12.5 Crores	12.5/81.25	WN 4 = 9.00%	1.38%
Total	₹ 81.25 Crores	100%		K₀ = 14.59%

6. Computation of Marginal Cost of Capital

Marginal Cost of Capital is computed in different segments as under —

For the first ₹1.5 Crores of Equity and Debt each — since retained earnings are ₹1.5 Crores.

For the next ₹1 Crores of Debt and Equity each — since cost of debt changes beyond ₹2.5 Crores debt.

For the balance ₹2.5 Crores of Debt and Equity each.

Particulars	Debt	Equity	Total	Individual Cost	Marginal WACC
First ₹1.5 Crores	₹1.5 Crores	₹1.5 Crores	₹3 Crores	WN 2: K _d = 9.00% WN 1: K _e = 16.00%	(9.00% × 50%) + (16.00% × 50%) = 12.50%
Next ₹1.5 Crores	₹1 Crores	₹1 Crores	₹2 Crores	WN 3: K _d = 9.60% WN 1: K _e = 18.25%	(9.00% × 50%) + (18.25% × 50%) = 13.63%
Balance Amount	₹2.5 Crores	₹2.5 Crores	₹2.5 Crores	WN 3: K _d = 9.60% WN 1: K _e = 18.25%	(9.00% × 50%) + (18.25% × 50%) = 13.93%

Illustration 45.**Computation of Cost of Debt, Equity and WACC - May 2005**

The R & G Co. has following capital structure at 31st March 2013, which is considered to be optimum -

Particulars	Amount (in ₹)
13% Debentures	3,60,000
11% Preference share Capital	1,20,000
Equity Share Capital (2,00,000 Shares)	19,20,000

The Company's Share has a current Market Price of ₹ 27.75 per Share. The expected Dividend per Share in the next year is 50 percent of the 2008 EPS. The EPS of last 10 years is as follows. The past trends are expected to continue -

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
EPS(₹)	1.00	1.120	1.254	1.405	1.574	1.762	1.974	2.211	2.476	2.773

The company can Issue 14 percent New Debenture. The Company's Debenture is currently selling at Rs.98. The New Preference Issue can be sold at a net price of ₹ 9.80, paying a dividend of ₹1.20 per share. The Company's marginal tax rate is 50%.

1. Calculate the After Tax Cost (a) of new Debt and new Preference Share Capital, (b) of ordinary Equity, assuming new Equity comes from Retained Earnings.
2. Calculate the Marginal Cost of Capital.



- How much can be spent for Capital Investment before new ordinary share must be sold? Assuming that retained earning available for next year's Investment are 50% of 2004 earnings.
- What will be Marginal Cost of Capital (cost of fund raised in excess of the amount calculated in part (3) if the Company can sell new ordinary shares to net ₹ 20 per share? The cost of Debt and of Preference Capital is constant.

Solution :

1. Computation of Cost of Additional Capital (component wise)

1. (a) After Tax Cost of New Debt	$\frac{\text{Interest} \times \text{Tax Rate}}{\text{Net Proceeds of Issue}} = \frac{14 \times 50\%}{105.54}$	= 6.63% (Note 1)
1. (a) After Tax Cost of New=Preference Share Capital	$\frac{\text{Preference Dividend}}{\text{Net Proceeds of Issue}} = \frac{₹ 1.20}{₹ 9.80}$	= 12.24%
1. (b) After Tax Cost of Ordinary Equity	$(\text{DPS} + \text{MPS}) + g = \frac{(2.773 \times 50\%)}{27.75} + 12\%$	= 17.00% (Note 1)

Note 1: Since Current 13% Debenture is selling at ₹ 98 (₹100 presumed as Par Value), the Company can sell 14% New Debentures at $(14\% \times 98) \div 13\% = ₹105.54$ approximately. Alternatively, K_d can also be computed as $(₹14 \times 50\%) \div ₹ 98 = 7.14\%$.

Note 2: For computing "g" i.e. Growth Rate under Realised Yield Method, the past average Growth Rate is at **12%**, in the following manner-

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
** EPS (₹)	1.00	1.120	1.254	1.405	1.574	1.762	1.974	2.211	2.476	2.773
Additioanl	—	0.120	0.134	0.151	0.169	0.188	0.212	0.237	0.265	0.297
Increase	—	12.00%	11.96%	12.04%	12.03%	11.94%	12.03%	12.01%	11.99%	12.00%

Note: % Increase in EPS = Additional EPS ÷ Previous Year EPS e.g. $0.120 \div 1.00$ etc.

Marginal Cost of Capital: Since the present Capital Structure is optimum (Refer 1st sentence in the), the additional funds will be raised in the same ratio in order to maintain the capital structure. Hence, Marginal Cost of Capital is **15.20%**, computed as under:

Component	Amount	%	Individual	WACC
Debt	3,60,000	15%	$K_d = 6.63\%$	0.99%
Preference Capital	1,20,000	5%	$K_p = 12.24\%$	0.61%
Equity Capital	19,20,000	80%	$K_e = 17.00\%$	13.60%
Total	24,00,000	100%	WACC = K_0	15.20%

Note: When K_d is taken at 7.14%, K_0 will be **15.28%**.

Retained Earnings available for further investments = 50% of 2008 EPS
 $= 50\% \times ₹ 2.773 \times 2,00,000 \text{ Shares}$
= ₹ 2,77,300

Hence, amount to be spent before selling new ordinary shares = ₹ 2,77,300.

Since Equity is 80% of the total funds employed, the total capital before issuing fresh equity shares =
 $₹ 2,77,300 \div 80\% = ₹ 3,46,625$.

Computation of Revised Marginal Cost of Capital if Equity Issue is made at Rs.20 per share

$$\text{Revised Cost of Ordinary Equity} = (\text{DPS} \div \text{MPS}) + g = \frac{(2.773 \times 50\%)}{27.75} + 12\% = 18.30\%$$

if MPS (i.e. Issue Price) = ₹ 20

Component	Amount	%	Individual	WACC
Debt	3,60,000	15%	$K_d = 6.63\%$	0.99%
Preference Capital	1,20,000	5%	$K_p = 12.24\%$	0.61%
Equity Capital	19,20,000	80%	$K_e = 18.93\%$	15.15%
Total	24,00,000	100%	WACC = K_0	16.75%

Note : When K_d is taken at 7.14%, Revised K_0 will be **16.82%**.

Illustration 46.**Computation of Marginal WACC - Redeemable Preference Share Capital (PSC) and Debt - May 2004.**

BC Limited has the following book value capital structure -

Equity Share Capital (150 million shares ₹10 par)	₹ 1,500 million
Reserves & Surplus	₹ 2,250 million
0.5% Preference Share Capital (1 million shares ₹100 par)	₹ 100 million
0.5% Debentures (1.5 million debentures ₹1000 par)	₹ 1,500 million
0.5% Term Loans from Financial Institutions	₹ 500 million

The debentures of ABC Limited are redeemable after three years and are quoting at ₹ 981.05 per debenture. The applicable income tax rate for the company is 35%.

The current Market Price per Equity Share is ₹60. The prevailing default risk free interest rate on 10 year GOI Treasury Bonds is 5.5%. The average market risk premium is 8%. The beta of the company is 1.1875.

The Preferred Stock of the Company is redeemable after 5 years and is currently selling at ₹ 98.15 per Preference Share.

1. Calculate the weighted cost of capital of the company using market value weights.
2. Define the marginal cost of capital schedule for the firm if it raises ₹750 million for a new project. The firm plans to have a target debt to value ratio of 20%. The beta of the new project is 1.4375. The debt capital will be raised through term loans. It will carry an interest rate of 9.5% for the first Rs.100 million and 10% for the next ₹ 50 million.

Solution :

1. **K_e (Cost of Equity Capital)** = Risk Free Rate + Risk Premium
 = Risk Free Rate + (Average Market Risk Premium × Beta)
 = 5.5% + (8% × 1.1875) = 5.5% + 9.5% = **15.00%**
2. **K_p (Cost of Preference Share Capital)** is computed using two alternative approaches as under -

(a) **Irredeemable Preference Capital:**

$$K_p = \text{Preference Dividend} \div \text{Market value of Preference Share Capital} = 10.5 \div 98.15 = \mathbf{10.70\%}$$



(b) **Redeemable Preference Capital:**

$$98.5\% = \frac{10.5}{(1 + YTM)^1} + \frac{10.5}{(1 + YTM)^2} + \frac{10.5}{(1 + YTM)^3} + \frac{10.5}{(1 + YTM)^4} + \frac{10.5}{(1 + YTM)^5}$$

Where YTM = Yield to Maturity. On solving, we get YTM=11% (approximately).

So, $K_p = 1\%$.

3. K_d (**Cost of Debentures**) is computed using two alternative approaches as under -

(a) **Irredeemable Debt (Check)**

$$\begin{aligned} K_d \text{ (for Debentures)} &= \frac{[\text{Interest} \times (100\% - \text{Tax rate})]}{\text{Market value of Debt}} \\ &= \frac{1,500 \times 9.5\% \times (100\% - 35\%)}{1471.575} = 6.29\% \end{aligned}$$

(b) **Redeemable Debt:**

$$98.15\% = \frac{95}{(1 + YTM)^1} + \frac{95}{(1 + YTM)^2} + \frac{95}{(1 + YTM)^3}$$

Where YTM = Yield to Maturity. On solving, we get YTM = 10% (approximately).

$$\text{So, } K_d = YTM \times (100\% - \text{TAX Rate}) = 10\% \times 65\% = \mathbf{6.5\%}.$$

4. K_d (**Cost of Term Loans**) is computed as under —

$$\begin{aligned} K_d \text{ (for Term Loans)} &= \frac{[\text{Interest} \times (100\% - \text{Tax rate})]}{\text{Market value of Debt}} \\ &= \frac{1,500 \times 8.5\% \times (100\% - 35\%)}{500} = 5.525\% \end{aligned}$$

5. (a) **Computation of Individual Cost of Capital and WACC**

Type of Capital	Market Value in ₹ millions	Ratio	Indl. Cost	WACC
Equity Share Capital	150×60 = 9000.000	81.30%	15.00%	12.20%
Reserver & Surplus	Included in Market Value of Equity Share Capital, hence note applicable			
10.5% Preference	1×98.15 = 98.150	0.89%	10.70%	0.09%
Share Capital				
9.5% Debentures	1.5×981.05 = 1471.575	13.30%	6.29%	0.84%
15% Term Loan from	Given 500.000	4.51%	5.53%	0.25%
Total	11069.725	100%		13.38%

5. (b) **Computation of Individual Cost of Capital and Wacc(using YTM calculations)**

Type of Capital	Market Value in ₹ millions	Ratio	Indl. Cost	WACC
Equity Share Capital	150×60= 9000.000	81.30%	15.00%	12.20%
Reserver & Surplus	Included in Market Value of Equity Share Capital, hence note applicable			
10.5% Preference	1×98.15= 98.150	0.89%	10.00%	0.09%
Share Capital				
9.5% Debentures	1.5×981.05= 1471.575	13.30%	6.50%	0.86%
15% Term Loan from	Given 500.000	4.51%	5.53%	0.25%
Total	11069.725	100%		13.40%

- 6. Marginal WACC:** Total Amount to be raised = ₹ 750 million, of which debt should be 20% i.e. ₹150 millions and equity 80%, being ₹ 600 millions. Since cost of debt changes after ₹100 millions, the Marginal WACC is computed in the following segments -

Particulars	Debt	Equity	Individual Cost	Marginal WACC
First ₹500 millions	100 millions	400 millions	$K_d = 9.5\% \times (100\% - 35\%) = 6.175\%$ $K_e = 5.5\% \times (8\% - 1.4375) = 17\%$	$K_0 = (6.175\% \times 20\%) + (17\% \times 80\%) = \mathbf{12.365\%}$
First ₹250 millions	50 millions	200 millions	$K_d = 10\% \times (100\% - 35\%) = 6.5\%$ $K_e = 5.5\% \times (8\% - 1.4375) = 17\%$	$K_0 = (6.5\% \times 20\%) + (17\% \times 80\%) = \mathbf{14.9\%}$

Illustration 47.

Computation of WACC

JKL Ltd has the following book - value capital structure as on 31st March -

Equity Share Capital (2,00,000 Shares)	₹40,00,000
11.5% Preference Shares	₹10,00,000
10% Debentures	₹30,00,000
Total	₹ 80,00,000

The Equity Shares of the Company sell for ₹ 20. It is expected that the Company will pay a dividend of ₹ 2 per share next year, this dividend is expected to grow at 5% p.a. forever. Assume 35% corporate tax rate.

1. Compute the Company's WACC based on the existing Capital Structure.
2. Compute the new WACC if the Company raises an additional ₹ 20 Lakhs debt by issuing 12% debentures. This would result in increasing the expected Equity dividend to ₹ 2.40 and leave the growth rate unchanged, but the price of equity share will fall to ₹ 16 per share.
3. Comment on the use of weights in the computation of WACC.

Solution:

(i) $K_e \frac{\text{Dividend per Share}}{\text{Market Price per Share}} + g = \frac{₹ 2.00}{₹ 20.00} + 5\% = 10\% + 1.5\% = 15.00\%$

(ii) K_d Net Proceeds of Issue 30,00,000 **6.50%**

(iii) K_p Preference Dividend ₹1,15,000 **11.50%**

Net Proceeds of Issue ₹10,00,000

1. Computation of WACC under present capital structure:

Particulars	Amount	%	Individual Cost	WACC
Debt	30,00,000	37.50%	$K_d = 6.50\%$	2.544%
Preference Capital	10,00,000	12.50%	$K_p = 11.50\%$	1.44%
Equity Capital	40,00,000	50.00%	$K_e = 15.00\%$	7.50%
Total	80,00,000	100%	WACC = K_0 =	11.38%



2. Computation of WACC under revised capital structure:

Component	Amount	%	Individual Cost	WACC
Present Debt	30,00,000	30%	$K_d = 6.50\%$	1.95%
New Debt at 12%	20,00,000	20%	$K_d = 7.80\%$	1.56%
Preference Capital	10,00,000	10%	$K_p = 11.50\%$	1.15%
Equity Capital	40,00,000	40%	$K_e = 20.00\%$	8.00%
Total	1,00,00,000	100%	WACC = K_0 =	12.66%

$$\text{Revised } K_e = \frac{\text{Dividend per Share}}{\text{Market Price per Issue}} + g = \frac{\text{₹ } 2.40}{\text{₹ } 16.00} + 5\% = 15\% + 5\% = \mathbf{20.00\%}$$

- 6. Use of Weights:** Market Value weights may be preferred to Book Value weights since they represent the Company's true corporate Facct. In the evalution of a Company's performance, Cash Flows are preferred to more Book Profits; also Market Value Balance Sheet is analysed in depth rather than the Book Value Balance Sheet.

Illustration 48.

Computation of Cost of Equity using Beta

You are analysing the beta for ABC Computers Ltd. and have dividend the Company into four broad business groups, with market values and betas for each group.

Business Group	Market value of Equity	Unleveraged beta
Main frames	₹100 billion	1.10
Personal Computers	₹ 100 billion	1.50
Software	₹ 50 billion	2.00
Printers	₹ 150 billion	1.00

ABC Computers Ltd. had ₹ 50 billion in debt outstanding.

Required :

- Estimate the beta for ABC Computers Ltd. as a Company. Is this beta going to be equal to the beta estimated by regressing past returns on ABC Computers stock against a market index. Why or Why not?
- If the treasury bond rate is 7.5% estimate the cost of equity of ABC Computers Ltd. Estimate the cost of equity for each division. Which cost of equity would you use to value the printer division? The average market risk premium is 8.5%.

Solution :

- Computation of Company Bets:

Group	Market value	Proportion	Unleveraged beta	Product beta
Mainframe	₹100 billion	25%	1.10	0.275
Presonal Computer	₹100 billion	25%	1.50	0.375
Software	₹ 50 billion	12.5%	2.00	0.250
Printers	₹150 billion	37.5%	1.00	0.375
Total	₹ 400 billion	100%	Unleveraged beta of portfolio	1.275

Note: Beta measures the volatility of ABC Computers' stock returns against a broad-based market portfolio. In the above case, the beta is calculated for four business groups in a computer segment and not a broad-based market portfolio. Hence, beta calculations will not be the same, as such.

$$\begin{aligned}\text{Beta of the Leveraged Firm } B(L) &= \text{Beta of Unleveraged Firm } B(U) \times [(Equity + Debt) \div Equity] \\ &= 1.275 \times [(400 + 50) \div 400] \\ &= \mathbf{1.434}\end{aligned}$$

Market Index Relationship: This leveraged Beta of **1.434** will be equal to the Beta estimated by regressing returns on ABC Computers stock against a market index. The reasoning is as under-

1. The Beta of a security is a measure of return for the systematic risk of that security, relative to the market i.e. its Systematic Risk.
2. A portfolio generally consists of a well - diversified set of securities.
3. The Systematic Risk cannot be diversified away, and hence, the Beta of a portfolio is the **value - weighted beta** of the securities constituting the portfolio.
4. The Beta of a portfolio depicts the systematic Risk (i.e. Non-Diversifiable Risk) of the portfolio itself.
5. Cost of **Equity for ABC Computers** = Return of Risk Free Securities + (Market Risk premium $\times$ Beta) = 7.50% + (8.50% $\times$ 1.434) = **19.69%**
6. **Cost of Equity for each Division**

Division	Cost of Equity for each Division = Return of Risk Free Securities + (Market Risk premium $\times$ Beta)
Mainframe	= 7.50% + (8.50% $\times$ 1.10) = 16.85%
Personal Computer	= 7.50% + (8.50% $\times$ 1.50) = 20.25%
Software	= 7.50% + (8.50% $\times$ 1.10) = 24.50%
Printers	= 7.50% + (8.50% $\times$ 1.00) = 16.00%

For valuing Printer Division, K_e of 16% would be used.

Illustration 49.

NOI & M&M Approach - RTP

ABC Ltd adopts constant WACC approach and believes that its cost of debt and overall cost of capital is at 9% and 12% respectively. If the ratio of the market value of debt to the market value of equity is 0.8, what rate of return do Equity Shareholders earn? Assume that there are no taxes.

Solution:

Constant WACC implies the use of NOI or M&M Approach. Under M&M Approach,

$$K_e = K_o + \text{Risk Premium.}$$

$$\text{So, } K_e = K_o + (K_o + K_d) \frac{\text{Debt}}{\text{Equity}}$$

$$\text{On substitution, we have, } K_e = 12\% + (12\% - 9\%) \times 80\% = \mathbf{14.4\%}$$

Alternatively, K_e can be obtained as balancing figure as under --

(Note: Debt: Equity = 0.8 = 4:5)



Component	%	Individual Cost in %	WACC %
Debt	4/9th	$K_d = 9.00\%$	$9.00\% \times 4/9\text{th} = 4.00\%$
Equity	5/9th	$K_e = 8.00 \div 5/9\text{th} = \mathbf{14.00\%}$ (final balancing figure)	$12\% - 4\% = \mathbf{8.00\%}$ (balance figure)

Illustration 50.

Traditional Theory - Optimum Cost of Capital

TT Ltd has a PBIT of ₹ 3 Lakhs. Presently the company is financed by equity capital of ₹ 20 Lakhs with Equity Capitalization Rate of 16%. It is contemplating to redeem a part of its Capital by introducing Debt Financing. It has two options—to raise debt to the tune of 30% or 50% of the total funds.

It is expected that for debt financing upto 30% will cost 10% Equity Capitalization Rate will rise to 17%. However, if the Firm opts for 50% debt, it will cost 12% and Equity Shareholders expectation will be 20%.

From the above, compute the Overall Cost of Capital of the different options and comment thereon.

Solution :

Plan	0% Debt	30% Debt	50% Debt
Debt	Nil	₹6,00,000	₹10,00,000
Equity Capital (bal. figure)	₹20,00,000	₹14,00,000	₹10,00,000
Total Assets	₹ 20,00,000	₹ 20,00,000	₹ 20,00,000
EBIT	₹3,00,000	₹3,00,000	₹3,00,000
Less: Interest	—	₹60,000	₹1,20,000
PBT	₹ 3,00,000	₹ 2,40,000	₹ 1,80,000
K_e	16%	17%	20%
Value of Equity (E) = $EBT \div K_e$	₹18,75,000	₹14,12,000	₹9,00,000
Add: Value of Debt (D)	—	₹6,00,000	₹10,00,000
Value of Firm = $V = (E+D)$	₹18,75,000	₹20,12,000	₹19,00,000
$WACC = K_e = EBIT \div V$	16.00%	14.91%	15.78%

Inference : Traditional Theory lays down that as debt content increases, rate of interest on debt increases & Equity Shareholders expectations also arise. Hence Value of Firm & WACC will be affected. By suitably altering Debt content the firm should achieve maximum Firm Value & minimum WACC.

Illustration 51.

M&M Approach - Value of Levered & Unlevered Firm - Computing WACC

Companies Uma and Lata are identical in every respect except that the former does not use debt in its capital structure, while the latter employs ₹ 6 Lakh of 15% Debt. Assuming that, (a) all the M&M assumptions are met, (b) the corporate tax rate is 35%, (c) the EBIT is ₹ 2,00,000 and (d) the equity capitalization of the unlevered Company is 20%. What will be the value of the firms - Uma and Lata? Also, determine the weighted Average Cost of Capital for both the firms.

Solution :

$$\begin{aligned} \text{Value of Unlevered Firm} = \text{Value of Equity only} &= \frac{[\text{PBIT} (100\% - \text{Tax Rate})]}{\text{Cost of Equity } K_e} = \frac{2,00,000 \times 65\%}{20\%} \\ &= \mathbf{₹ 6,50,000} \end{aligned}$$

$$\begin{aligned}\text{Value of Levered Firm} &= \text{Value of Unlevered Firm} + (\text{Value of Debt} \times \text{Tax Rate}) \\ &= ₹ 6,50,000 + (₹ 6,00,000 \times 35\%) = ₹ 8,60,000.\end{aligned}$$

Particulars	(Unlevered) Uma	(Levered) Lata
EBIT	2,00,000	2,00,000
Less: Interest on Debt (₹6,00,000×15%)	—	90,000
EBT	2,00,000	1,10,000
Less: Tax at 35%	70,000	38,500
EAT	1,30,000	71,500
Value of Firm (V) (as computed above)	6,50,000	8,60,000
Less: Value of Debt (D)	Nil	6,00,000
Value of Equity (E) = (V) – (D)	6,50,000	2,60,000
Cost of Equity = EAT ÷ Value of Equity	20%	27.5%
Cost of Debt	Nil	15%×65%=9.75%
WACC = $K_d \times \frac{D}{V} + K_e \times \frac{E}{V}$	20%	$9.75\% \times (60/86) = 6.80\%$ $+ 27.5\% \times (26/86) = 8.31\%$ WACC = 15.11%

Illustration 52.**Traditional and M&M Approach**

A Company estimates its Cost of Debt and Cost of Equity for different debt - equity mix, as under.

% of Debt	0%	20%	40%	60%	80%	90%
Cost of Debt	—	10%	10%	12%	14%	16%
Cost of Equity	18%	19%	21%	25%	32%	40%

1. Compute the Overall Cost of Capital and Optimal Debt - Equity Mix under the Traditional Theory.
2. Consider the Cost of Debt at different debt - equity mix as given above. If M&M Approach were to hold good, what will be the cost of Equity Capital at different debt - equity mix? What will be the Risk Premium?

Solution: 1. Computation of K_0 at different Debt - Equity Mix (Traditional Theory)

Situation	% of Debt and K_d		% of Equity and K_e		WACC i.e. K_0
I	0%	Nil	100%	18%	$(0 \times Nil) + (100\% \times 18\%) = 18.0\%$
II	20%	10%	80%	19%	$(20\% \times 10\%) + (80\% \times 19\%) = 17.2\%$
III	40%	10%	60%	21%	$(40\% \times 10\%) + (60\% \times 21\%) = \mathbf{16.6\%}$
IV	60%	12%	40%	25%	$(60\% \times 12\%) + (40\% \times 25\%) = \mathbf{17.2\%}$
V	80%	14%	20%	32%	$(80\% \times 14\%) + (20\% \times 32\%) = 17.6\%$
VI	90%	16%	10%	40%	$(90\% \times 16\%) + (10\% \times 40\%) = 18.4\%$



From the above, the optimal debt equity mix is 40% Debt and 60% Equity, relating to least WACC of **16.6%**.

2. Computation of Cost of Equity under M&M Approach

Under M&M approach, WACC = K_e at 0% Debt: Since WACC is constant, WACC at 0% Debt (i.e. 100% Equity) should be the same as WACC at any other percentage of debt. Hence WACC = K_e when the Firm is financed purely by Equity. So, WACC of a Firm equals the Capitalization Rate of pure equity stream of its class of risk. In the above case, WACC = K_e at 0% Debt = 18%.

$$\text{So, } K_e = K_0 + (K_0 - K_d) \frac{\text{Debt}}{\text{Equity}}$$

Situation	Debt: Equity	K_0 (Constant)	K_d	$K_e = K_0 + (K_0 - K_d) \times D/E$	Risk Premium = $K_e - K_0$
I	Nil	18%	Nil	$18\% + (18\% - 0\%) \times 0 = 18.00\%$	Nil
II	20:80	18%	10%	$18\% + (18\% - 10\%) \times 2/8 = 20.00\%$	2.00
III	40:60	18%	10%	$18\% + (18\% - 10\%) \times 2/8 = 20.00\%$	5.33%
IV	60:40	18%	12%	$18\% + (18\% - 10\%) \times 4/6 = 27.00\%$	9.00%
V	80:20	18%	14%	$18\% + (18\% - 14\%) \times 8/28 = 34.00\%$	16.00%
VI	90:10	18%	16%	$18\% + (18\% - 16\%) \times 9/1 = 36.00\%$	18.00%

LEASING**Illustration 53.**

ABC Company Ltd. is faced with two options as under in respect of acquisition of an asset valued ₹1,00,000/-

EITHER

- a) to acquire the asset directly by taking a Bank Loan of ₹1,00,000/- repayable in 5 year-end instalments at an interest of 15%.

OR

- b) to lease in the asset at yearly rentals of ₹320 per ₹1,000 of the asset value for 5 years payable at year end.

The following additional information are available.

- a) The rate of depreciation of the asset is 15% W.D.V.
 b) The company has an effective tax rate of 50%.
 c) The company employees a discounting rate of 16%.

You are to indicate in your report which option is more preferable to the Company. Restrict calculation over a period of ten years

The present value of one Rupee due at the end of each year is

End of year	1	2	3	4	5	6	7	8	9	10
Present Value	0.86207	0.74316	0.64066	0.55229	0.47611	0.41044	0.35313	0.30503	0.26295	0.22668

Solution:**ABC Company Ltd :****Appraisal of Buying Decision: PV of Cash Out Flows (fig in `)**

Year	Principal repayment	Interest	Out flow	Tax savings on dep	Tax savings on int	Net cash out flow	PV factor @ 16%	Present value
1	20000	15000	35000	7500	7500	20000	0.86207	17241.4
2	20000	12000	32000	6375	6000	19625	0.74316	14584.5
3	20000	9000	29000	5420	4500	19080	0.64066	12223.8
4	20000	6000	26000	4606	3000	18394	0.55229	10158.8
5	20000	3000	23000	3915	1500	17585	0.47611	8372.4
6	-	-	-	3328	-	(3328)	0.41044	(1366)
7	-	-	-	2829	-	(2829)	0.35313	(999.0)
8	-	-	-	2405	-	(2405)	0.30503	(733.6)
9	-	-	-	2044	-	(2044)	0.26295	(537.5)
10	-	-	-	1737	-	(1737)	0.22668	(393.7)
								58560

Net present value of out flows ₹ 58,560

- b). Appraisal of Leasing Decision: Present Value of Cash outflows under Lease Alternative

Lease rent per year is $320/1000 \times 100000 = ₹ 32,000$

Year	Lease rent (₹)	Tax savings (₹)	Net out flow (₹)	PVCF @ 16%	Present value (₹)
1-5	32000	16000	16000	3.27429	52390

PVCF = Present Value of Cashflow



From “a” and “b” ,it is Advise to lease ,Since the net cash outflow is lower under Lease alternative.

However , It is not wise to compare the two project with different life periods. So,consider equivalent annual cash out flows ,which is calculated as follows,

Leasing : ₹52,390/3.27429 = ₹16,000

Buying : ₹58,552/4.83252 = ₹12,115. **So advised to Buy the Asset.**

Illustration 54.

Elite Builders has been approached by a foreign embassy to build for it a block of six flats to be used as guest houses. As per the terms of the contract, the foreign embassy would provide Elite Builders the plans and the land costing ₹25 lakhs. Elite Builders would build the flats at their own cost and lease them to the foreign embassy for 15years. At the end of which the flats will be transferred tot the foreign embassy for a nominal value of ₹ 8 lakh. Elite Builders estimates the cost of constructions as follows:

Area per flat, 1,000 sq. feet ; Construction cost, ₹400 per sq. feet ; Registration and other costs, 2.5 per cent of cost of construction; Elite Builders will also incur ₹4 lakhs each in years 14 and 15 towards repairs.

Elite Builders proposes to charge the lease rentals as follows:

Years	Rentals
1 - 5	Normal
6 – 10	120 per cent of normal
11 - 15	150 per cent of normal

Elite builders present tax rate averages at 35 per cent which is likely to be the same in future. The full cost of construction and registration will be written off over 15 years at a uniform rate and will be allowed for tax purposes.

You are required to calculate the normal lease rental per annum per flat. For your exercise you may assume: (a) Minimum desired return of 10 per cent, (b) Rentals and repairs will arise on the last day of the year, and, (c) Construction, registration and other costs will be incurred at time= 0.

Solution:

Calculation of present value of Cash out flow:

(₹)

Cost of construction 400x1,000x6		24,00,000
Registration and other costs @ 2.5%		60,000
Cost of Repairs	4,00,000	
(-) tax savings @ 35%	1,40,000	
	2,60,000	
At t_{14} = Present value = 2,60,000 x 0.26333 = 68466		
At t_{15} = present value = 2,60,000 x 0.23939 = 62241		
		1,30,707
		25,90,707 (Rounded of to 25,90,700)

Let 'X' be Normal lease rent per 6 flats per annum. P/V of Recurring Cash Inflow for 15 years

Particulars	1-5 years	6-10 years	11-15 years
Lease Rent p.a.	X	1.2 X	1.5 X
Depreciation	164,000	164,000	164,000
PBT 24,60,000/15	X-164,000	1.2X-164000	1.5X-164,000

PAT 65 %	$0.65X - 106600$	$0.78X - 106600$	$0.975X - 106600$
CIAT = PAT + Dep.	$0.65X + 57400$	$0.78X + 57400$	$0.975X + 57400$
PVCF	3.7908	2.3538	1.4615
PV	$2.4635X + 217592$	$1.836X + 135108$	$1.42X + 83890$

Total = $5.7195X + 436590$

P/V of Terminal Cash Inflows: ₹

Nominal value of flats after 15 years	800,000
Less: Tax on Profit $[800000 \times 35\%]$	280,000
	<u>520,000</u>

$P/V = 520,000 \times 0.239 = ₹124,280$

At 10% Rate of Return: P/V of Cash Inflows = P/V of Cash outflows

$5.719X + 436,590 + 124,280 = 2590700$

$X = ₹3,54,896$.

Lease Rent per Flat = $354896/6 = ₹59,150$

Illustration 55.

The Sharda Beverages Ltd has taken a plant on lease, valued at ₹ 20 crore. The lease arrangement is in the form of a leveraged lease. The Kuber Leasing Limited is the equity participant and the Hindusthan Bank Ltd. (HBL) is the loan participant. They fund the investment in the ratio of 2:8. The loan from HBL carries a fixed rate of interest of 19 percent, payable in 6 equated annual installments. The lease term is 6 years, with lease rental payable annually in arrear.

- Compute the equated annual installment from the point of view of HBL.
- If the lease rate is unknown, and HBL's per-tax yield is 25 percent, what is the minimum lease rent that must be quoted?

Solution:

Cost of the asset	₹ 20cr
Debt Equity ratio	2: 8
Loan raised $(20 \times 8 / 10)$	₹16cr
Rate of interest	19%

- Computation of annual installment

$$X + PVCF_{6yr19\%} = ₹16cr$$

$$X = 4,69,23,573$$

- Let the lease rent be X

$$\begin{aligned} \text{Net out flow} &= \text{Lease rent} - \text{Loan installment} \\ &= X - 46923573 \end{aligned}$$

Then,

$$(X - 46923573) PVCF_{6yr25\%} = 40000000$$

$$X = 6,04,76,463.$$

**Illustration 56.****Basic Information:**

- i) Asset related: Cost ₹120 lacs; Tax depreciation 40%; Useful life 4 years; Residual value after three years ₹25.92 lacs.
- ii) Leasing: Full pay out; Three year lease; Lease Quote ₹434 per 1,000; Payment annually in arrears
- iii) Borrow and buy Three-year loan; Interest rate 15%; Quantum to be determined, such that annual repayment of principal will be equal to annual lease rental payment.
- iv) Other: Tax Rate is 40%, and opportunity cost of capital is 11%.

Based on information given above, determine the preferred option as between leasing and buying.

Solution:**Appraisal of Leasing decision****Benefits of leasing (₹ in lakhs)**

1.	Saving in Investment	120.00
2.	PV of tax shield on lease rentals	50.91
		170.91

Cost of leasing (₹ in lakhs)

Present Value of lease rentals	118.91
PV of tax shield on depreciation	31.70
PV of tax shield on Interest	12.54
PV of terminal cash inflows (25.92X0.7312)	18.95
	182.10

Net advantage of leasing ₹ = (170.91 -182.1) lakhs ₹ = (11.19) lakhs. Hence, it is better to purchase the asset than to lease.

Working notes :**1. Calculation of present value of lease rentals**

(₹ in lakhs)

Lease rent per year $434/1000 \times 120$ 52.08

Present value lease rent $52.08 \times PVCF_{3yr, 15\%}$ 118.91

2. Present value of tax shield on lease rentals**(Amount in ₹ lakhs)**

Year	Lease rental	Tax saving	PV @ 11%	Present value
1	52.08	20.83	0.9009	18.7657
2	52.08	20.83	0.8116	16.9056
3	52.08	20.83	0.7312	15.2308

TOTAL = 50.9100

3. Present value of depreciation tax shield

(Amount in ₹ lakhs)

Year	Book value	Depreciation	Tax savings	PV @11%	Present value
1	120	48	19.20	0.9009	17.2972
2	72	28.8	11.52	0.8116	9.3496
3	43.2	17.28	6.91	0.7312	5.0526
4	25.92	10.368	4.147	0.6587	2.7316

4. Calculation of interest tax shield

(Amount in ₹ lakhs)

Year	o/s loan	Interest	Installment	Principal	PV @ 11%	Present value
1	118.91	17.835	52.08	34.245	0.9009	6.427
2	84.655	12.698	52.08	39.382	0.8116	4.122
3	45.263	6.817	52.08	45.263	0.7312	1.995
					Total	12.54

Present value of terminal cash inflows = $25.92 \times 0.7312 = ₹18.95$ lakhs

Present value of lease rental = ₹118.91 lakhs

Interest rate @ 15% ; No of installments = 3

Installment amount = $118.91 / PVCF_{3yr15\%} = ₹52.08$ lakhs**Illustration 57.**

HB Finance Ltd is considering to enter the computer leasing business. Mainframe computers can be purchased for ₹2,00,000 each and, in turn, be leased out at ₹50,000 per year for 8 years with the initial payment occurring at the end of first year. You may ignore taxes and depreciation.

- Estimate the annual before tax expenses and internal rate of return (IRR) for the company.
- What should be the yearly lease payment charged by the company in order to earn a 20 percent annual compounded rate of return before expenses and taxes?
- Assume that the firm uses the straight-line method of depreciation, there is no salvage value, the annual expenses are ₹20,000, and the tax rate is 35%. Calculate the yearly lease payment in order to enable the firm to earn 20 percent after tax annual compound rate of return.
- Further, assume that computer has a resale value of ₹40,000. Determine the revised lease rental to enable the firm to earn 20 per cent.

Solution:

- Cost of the Asset** ₹ 2,00,000
 Life 8 years
 Lease rent ₹ 50,000 p.a
 $(50,000)PVCF_{8yrIRR} = 2,00,000$
 $PVCF_{8yrIRR} = 4$
 $IRR = 18.63\%$
- Calculation of yearly lease rent to be charged to earn 20% return**
 Let the yearly lease rent be x
 $xPVCF_{5yr20\%} = 200000$



$$x = 200000 / 3.8372$$

$$x = ₹ 52120$$

- c) Let x be the yearly lease rent

Computation of cash inflows per annum

Lease rent	x
(-) annual expenses	20,000
Depreciation	25,000
PBT	x-45,000
PAT @ (1-35%) $0.65x - 29,250$	
CIAT $0.65x - 4,250$	
Cash in flows after tax	
Present value for 8years @ 20% = $(0.65x - 4250) 3.8372 =$	2,00,000
Yearly lease rent x = ₹86,725	

- d) **Present value of cash outflows**

Cost of computer	2,00,000
Present value of recurring cash inflows	
Lease rent	x
(-) annual expenses	20,000
Depreciation	20,000
PBT	x - 40,000
PAT @ (1-35%) $0.65x - 26,000$	
CIAT $0.65x - 6000$	
Present value for 8years @20% = $(0.65x - 6,000)3.872$	
Present value of terminal cash inflows	
Resale value 40000	
Its present value $(40000 \times 0.23257) = ₹9303$	
At 20%, Inflows = Outflows	
$(0.65x - 6,000) 3.8372 + 9303 = 2,00,000$; Revised lease rent, x = ₹85,687.	

Illustration 58.

Beta Ltd is considering the acquisition of a personal computer costing ₹50,000. The effective life of the computer is expected to be five year The company plans to acquire the same either by borrowing ₹ 50,000 from its bankers at 15% interest p.a. or on lease. The company wishes to know the lease rentals to be paid annually, which match the loan option. The following further information is provided to you:

- (a) The principal amount of loan will be paid in five annual equal installments.
- (b) Interest, lease rentals, principal repayment are to be paid on the last day of each year.
- (c) The full cost of the computer will be written off over the effective life of computer on a straight-line basis and the same will be allowed for tax purposes

- (d) The company's effective tax rate is 40% and the after-tax cost of capital is 9%
 (e) The computer will be sold for ₹1,700 at the end of the 5th Year. The commission on such sales is 9% on the sale value.

You are required to compute the annual lease rentals payable by Beta Ltd, which will result in indifference to the loan option.

Solution:

Computation of Net Cash outflow if the Asset is Purchased by Borrowing

Year	Principal repayment (₹)	Interest (₹)	Installment (₹)	Tax savings on interest (₹)	Tax savings on dep (₹)	Net cash out flow (₹)	PV @ 9%	Present value (₹)
1	10000	7500	17500	3000	4000	10500	0.91743	9633
2	10000	6000	16000	2400	4000	9600	0.84168	8080
3	10000	4500	14500	1800	4000	8700	0.77218	6718
4	10000	3000	13000	1200	4000	7800	0.70843	5526
5	10000	1500	11500	600	4000	6900	0.64993	4485

Present Value of Total out flow of cash = ₹ 34,442

Less: Present value of terminal cash inflows

Sale value of asset	₹1700
(-) Commission	₹153
	₹1547
(-)Tax on profit @ 40%	₹619
	₹928

Its Present value (₹928 x 0.64993) ₹603

Net cash out flow ₹33,839

Since we are required to find the annual lease rental payable , which will result in indifference to loan option. The present value of net cash out flow will be the same in each case.

Computation of break even lease rent :

Let x be the break even lease rent

Present value of cash out flow

Lease rent	x
(-) Tax saving (x @ 40%)	0.4x

Lease rent after tax per year 0.6x

Present value of lease rental for five years = (0.6x) x (3.8896) = 33,839

x = ₹14,500 .



Illustration 59.

ABC leasing Ltd. is in the process of making out a proposal to lease certain equipment. The cost of the equipment is ₹10,00,000 and the period of lease is 10 years. The following additional information is available. You are required to determine the equated annual rent to be charged for the proposal.

- The machine can be depreciated fully over the 10 years on straight-line basis
- The current effective tax rate is 40% and expects to go down to 30% from the beginning of the 6th year of the lease.
- It is the normal objective to make a 10% post-tax return in its lease pricing
- Lease management fee of 1% of the value of the asset is usually collected from the lessees upon signing of the contract of lease, to cover the overhead costs related to processing of the proposal.
- Annual lease rents are collected at the beginning of every year.

Solution:

TVS Leasing Company

Present value of cash out flow

Cost of equipment Rs10,00,000

=>let X be the equated annual lease rent

Present value of lease rentals after tax

Year	Lease rent	Tax	Net cash in flow	Pv @ 10%	Present value
0	X	-	X	1.0000	X
1-5	X	0.4X	0.6X	3.7908	2.2745X
6-9	X	0.3X	0.7X	1.9680	1.3776X
10	0	0.3X	(0.3X)	0.3855	(0.1158X)

Present value of total recurring cash inflows = 4.5364X

Calculation of tax shield on depreciation

Year	Depreciation	Tax benefit	Pv @ 10 %	Present value
1-5	100000	40000	3.7908	151600
6-10	100000	30000	2.3540	70620
				222220

At 10%, Inflows = Outflows

$$1000000 = 4.5364X + 222220$$

X = ₹ 1,71,453. Therefore, Equated annual rent is ₹1,71,453

Illustration 60.

The management of Power Tech. Ltd. must choose whether to go ahead with either of two mutually exclusive projects A and B. The expected profits are as follows:

Particulars	Profit if there is strong demand	Profit/(loss) if here is weak demand
Option A (₹)	4,000	(1,000)
Option B (₹)	1,500	500
Probability of demand	0.3	0.7

- What would be the decision, based on expected values, if no information about demand were available?
- What is the value of perfect information about demand?

Solution :

- (a) If there were no information to help with the decision, the project with the higher EV of profit would be selected.

(₹)

Probability	Project A		Project B	
	Profit	EV	Profit	EV
0.3	4,000	1,200	1,500	450
0.7	(1,000)	(700)	500	350
1.0		500		800

Analysis : Project B would be selected. This is clearly the better option if demand turns out to be weak. However, if demand were to turn out to be strong, Project A would be more profitable. There is a 30% chance that this could happen.

- (b) Perfect information will indicate for certain whether demand will be weak or strong. If demand is forecast '*weak*' Project B would be selected. If demand is forecast as '*strong*', Project A would be selected, and perfect information would improve the profit from ₹ 1,500, which would have been earned by selecting B, to ₹ 4,000.

Forecast demand	Probability	Project chosen	Profit	EV of profit
Weak	0.7	B	500	350
Strong	0.3	A	4,000	1,200
EV of profit with perfect information				1,550

The Value of Perfect Information derives from the 0.3 probability that if demand is going to be strong, the information would reveal this fact, and the decision is changed from '*choose B*' to '*choose A*' thereby earning ₹ 2,500 more profit. The EV of the Value of Perfect Information is therefore $0.3 \times ₹ 2,500 = ₹ 750$. Another way of making this same calculation is as follows:

(₹)

EV of profit without Perfect Information (i.e., choose B all the time)	800
EV of profit with Perfect Information	1,550
Value of Perfect Information	750



Analysis: Provide that the information does not cost more than ₹ 750 to collect, it would be worth having.

Illustration 61.

A manager is trying to decide which of three mutually exclusive projects to undertake. Each of the projects could lead to varying net profits which are classified as outcomes I, II and III. The manager has constructed the following pay-off table or matrix (a conditional profit table).

Net profit if outcome turns out to be :

Project	I	II	III
A	50,000	65,000	80,000
B	70,000	60,000	75,000
C	90,000	80,000	55,000
Probability	0.2	0.6	0.2

Which project should be undertaken?

Solution:

If the project with the highest EV of profit were chosen, this would be project C. (₹)

Outcome	Probability	Project A EV	Project B EV	Project C EV
I	0.2	10,000	14,000	18,000
II	0.6	39,000	36,000	48,000
III	0.2	16,000	15,000	11,000
	1.0	65,000	65,000	77,000

However, if the maximum criterion were applied, the assessment would be as follows:

Project Selected	The worst outcome that could happen	Profit (₹)
A	I	50,000
B	II	60,000
C	III	55,000

Analysis: By choosing B, we are 'guaranteed' a profit of at least ₹ 60,000, which is more than we would get from project A or C if the worst outcome were to occur for them. The decision would therefore be to choose project B.

Illustration 62.

XYZ Ltd. is considering a project with the following expected cash flows. Initial investment ₹ 1,00,000. Expected cash inflows 1st year ₹ 70,000; 2nd year ₹ 60,000; 3rd year ₹ 45,000. The cost of capital is 10%. Due to uncertainty of future cashflows, the management decides to reduce the cash inflows to certainty equivalent by taking only 80%, 70% and 60% respectively. Is it worth while to take up the project?

Calculation of Certainty Equivalents of Cash Inflow:

1st year	70,000 × 80/100	= ₹ 56,000
2nd year	60,000 × 70/100	= ₹ 42,000
3rd year	45,000 × 60/100	= ₹ 27,000

Calculation of Risk Adjusted NPV of the Project:

Year	Cash flow (₹)	P.Y. factor (10%)	P.V. (₹)
0	(1,00,000)	1.000	(1,00,000)
1	56,000	0.909	50,904
2	42,000	0.826	34,692
3	27,000	0.751	20,277
			NPV = 5,873

Decision: The NPV of the project is positive and, therefore, the project can be selected.

Illustration 63.

A Production Manager is planning to produce a new product and he wishes to estimate the raw material requirement for that new product. On the basis of usage for a similar product introduced previously, he has developed a frequency distribution of demand in tonnes per day for a two month period. Used this data to simulate the raw material usage requirements for 7 days. Compute also expected value and comment on the result.

Demand Tonnes/day	Frequency No. of days
10	6
11	18
12	15
13	12
14	6
15	3

Solution:

Demand Tonnes/day	Frequency No. of days	Probability	Cumulative Probability	Random Numbers
10	6	0.10	0.10	00.09
11	18	0.30	0.40	10.39
12	15	0.25	0.45	40.64
13	12	0.20	0.85	65.84
14	6	0.10	0.95	85.94
15	3	0.05	1.00	95.99
60		1.00		

The first seven random numbers (two digits only) are simulated:

Random No.	Corresponding demand Tonnes/day
27	11
13	11
80	13



10	11
54	12
60	12
49	12
	82

Mean requirement per = $82 / 7 = 11.7$ Tonnes

The expected value (EV) = $(10 \times 0.1) + (11 \times 0.3) + (12 \times 0.25) + (13 \times 0.2) + (14 \times 0.1) + (15 \times 0.05)$
= 12.05 Tonnes

The difference = $12.05 - 11.7 = 0.35$

This indicate that the small sample size of only 7 hadys had resulted in some error. A much larger sample should be taken and several samplex should be simulated before the simulation results are used for decision making.

Illustration 64.

The Financial Controller of Super Stocks Ltd. has drawn the following projections with probability distributions:

Wages & salaries (₹ '000)	Probability	Raw material	Probability	Sales revenue	Probability
10-12	0.3	6-8	0.2	30-34	0.1
10-12	0.5	8-10	0.3	34-38	0.3
10-12	0.2	10-12	0.3	38-42	0.4
		12-14	0.2	42-46	0.6

Your are required to simulate the cash flow projecton from the following random numbers:

Wages and salaries	2	7	9	2	9	2
Raw materials	4	4	1	0	3	4
Sales Revenue	0	6	6	8	0	2

Solution:

Simulation of Cash flow projection

Random number allocation

Wages and Salaries			Raw Materials			Values Revenue		
Midpoint (₹ '000)	Cum. Prob.	Random Nos.	Midpoint (₹ '000)	Cum. Prob.	Random Nos.	Midpoint (₹ '000)	Cum. Prob.	Random Nos.
11	0.3	0-2	7	0.2	0-1	32	0.1	0
13	0.8	3-7	9	0.5	2-4	36	0.4	1-3
15	1.0	8-9	11	0.8	5-7	40	0.8	4-7
			13	1.0	8-9	44	1.0	8-9

Simulation of cash flow

(₹ '000)

Month	Wages & salaries	Raw materials	Sales revenues	Fixed costs	Net Cash flow	Cash balance (O B ₹50)
1	11	9	32	14	-2	48
2	13	9	40	14	+4	52
3	15	7	40	14	+4	56
4	11	7	44	14	+12	68
5	15	9	32	14	-6	62
6	15	9	36	14	-2	60

From the above simulation it will be observed that there are 3 months which have net cash outflows, the probability of net cash outflows can therefore be estimated as $3/6=0.5$. From the above table, the estimated cash balance at the end of sixth month is ₹60,000.

(b) Expected Value Method of Cash Flows Projection

EV of salaries and wages	$= (11 \times 0.3) + (13 \times 0.5) + (15 \times 0.2)$	$= 12,800$
EV of Raw materials	$= (7 \times 0.2) + (9 \times 0.3) + (11 \times 0.3) + (13 \times 0.2)$	$= 10,000$
EV of sales revenue	$= (32 \times 0.1) + (36 \times 0.3) + (40 \times 0.3) + (44 \times 0.2)$	$= 34,800$
Expected net cash inflow per month	$= 34,800 - 12,800 - 10,000 - 14,000$	$= ₹2,000$
Expected net cash inflow per month	$= 50,000 + (2,000 \times 6)$	$= ₹62,000$

The difference between ₹60,000 and ₹62,000 is due to sample error. If a number of simulation iterations were carried out then the mean of the balances predicted should approach the expected value more and closely as the number was increased.

Illustration 65.

Infoway Ltd. is considering the purchase of an automatic pack machine to replace the 2 machines which are currently used to pack Product X. The new machine would result in reduced labour costs because of the more automated nature of the process and in addition, would permit production levels to be increased by creating greater capacity at the packing stage with an anticipated rise in the demand for Product X, it has been estimated that the new machine will lead to increased profits in each of the next 3 years. Due to uncertainty in demand however, the annual cash flows (including savings) resulting from purchase of the new machine cannot be fixed with certainty and have therefore, been estimated probabilistically as follows:

Annual cost flows:

Year 1	Probability	Year 2	Probability	Year 3	Probability
10	0.3	10	0.1	10	0.3
15	0.4	20	0.2	20	0.5
20	0.3	30	0.4	30	0.2
		40	0.3		

Because of the overall uncertainty in the sales of Product X, it has been decided that only 3 years cash flows will be considered in deciding whether to purchase the new machine. After allowing for the scrap value of the existing machines, the net cost of the new machine will be ₹42,000. The effects of taxation should be ignored.

Required:



- a. Ignoring the time value of money, identify which combinations of annual cash flows will lead to an overall negative net cash flow, and determine the total probability of this occurring.
- b. On the basis of the average cash flow for each year, calculate the net present value of the new machine given that the company's cost of capital is 15%. Relevant discount factors are as follows:

Year	Discount factor
1	0.8696
2	0.7561
3	0.6575

- c. Analyse the risk inherent in this situation by simulating the net present value calculation. You should use the random number given at the end of the illustration in 5 sets of cash flows. On the basis of your simulation results what is the expected net present value and what is the probability of the new machine yielding a negative net present value?

	Set 1	Set 2	Set 3	Set 4	Set 5
Year 1	4	7	6	5	0
Year 2	2	4	8	0	1
Year 3	7	9	4	0	3

Solution:

- d. If the total cash flow in years 1, 2 and 3 is less than ₹42,000, the net cash flow will be negative. The combinations of cash flow which total less than ₹42,000 are given in table below:

Cash flow

(₹ '000)

Year 1	Year 1	Year 1	Total	Probability
10	10	10	30	$0.3 \times 0.1 \times 0.3 = 0.009$
10	10	20	40	$0.3 \times 0.1 \times 0.5 = 0.015$
10	20	10	40	$0.3 \times 0.2 \times 0.3 = 0.018$
15	10	10	35	$0.4 \times 0.1 \times 0.3 = 0.012$
20	10	10	40	$0.3 \times 0.1 \times 0.3 = 0.009$
				Total = 0.063

The probability of a negative cash flow is 0.063

b. Expected cash flow = Σ [Cash flow $\times$ Probability]

	(₹ '000)
Year 1 EV = $(10 \times 0.3) + (15 \times 0.4) + (20 \times 0.3)$	15
Year 2 EV = $(10 \times 0.1) + (20 \times 0.2) + (30 \times 0.4) + (40 \times 0.3)$	29
Year 3 EV = $(10 \times 0.3) + (20 \times 0.5) + (30 \times 0.2)$	19

P.V. of the cash = $(15 \times 0.8696) + (29 \times 0.7561) + (19 \times 0.6575) = 47.4634$

The net present value of the new machine = $47,463 - 42,000 = ₹ 5,463$

c. Allocate random number ranges to the cash flows for each year.

	Cashflow (₹ '000)	Probability	Random number
Year 1	10	0.3	0.2
	15	0.4	3.6
	20	0.3	7.9
Year 2	10	0.1	0
	20	0.2	1-2
	30	0.4	3-6
	40	0.3	7-9
Year 3	10	0.3	0.2
	20	0.5	3-7
	30	0.2	8-9

We can now carry out the simulation.

(₹ 000)

Year 1			Year 2			Year 3				
Number	Random	Cash	DCF	Random	Cash	DCF	Random	Cash	DCF	Net PV
1	4	15	13.044	2	20	15.122	7	20	13.150	-6.684
2	7	20	17.392	4	30	22.683	9	30	19.725	17.800
3	6	15	13.044	8	40	30.244	4	20	13.150	14.438
4	5	15	13.044	0	10	7.561	0	10	6.575	-14.820
5	0	10	8.696	1	20	15.122	3	20	13.150	-5.032
									Total	11.702

The average net present value of the cash flow = $11,702/5 = ₹2,340.40$

Three out of the five simulations produced negative NPV, therefore, we estimate the probability of a negative NPV as $3/5=0.6$. Since the simulation is small, the estimates are unlikely to be reliable.

Illustration 66.

A project had an equity beta of 1.2 and was going to be financed by a combination of 3 debt and 70% equity (assume debt beta = 0). Calculate the Project Beta. Assume $R_t = 10\%$ and $R_o = 18\%$.

Solution:

$$\begin{aligned}
 \beta_D &= \left(\beta_{\text{Equity}} \times \frac{E}{D+E} \right) + \left(\beta_{\text{debt}} \times \frac{D}{D+E} \right) \\
 &= (1.2 \times 0.70) + (0 \times 0.30) = 0.84 \\
 RRR_2 &= R_t + \beta_p (R_m - R_t) \\
 &= 10\% + 0.84 (18\% - 10\%) = 10\% + 6.72\% = 16.72\%
 \end{aligned}$$

So, the riskiness of this investment suggests that the project should earn a required rate of return of about 16.7% (greater than the market rate of return).

Many companies introduce the concept of discounting risky cashflows at different rates when they introduce variable risk premiums for different types of investments. They set different required rates of return, or hurdle rates, for their investment projects depending on the nature of the investment. This is usually in the form of a premium on what is considered the basic company cost of capital. In some



cases they take the four broad categories of investment projects and they assess the degree of risk generally associated with each type of investment. Thus a company may set up a decision rule which gives the following risk premiums:

1. Safety and maintenance investments (financing decision) - *no risk* as it is simply a financing decision to choose the investment with the lowest cost = Zero risk premium
2. Cost-saving investments - *low risk* = 3% risk premium
3. Expansion investments - *moderate risk* as taking existing products into new markets or new products into existing markets = 6% risk premium
4. Diversification investments - *high risk* as expanding with new products into new markets = 9% risk premium

Sometimes the decision rule will not be on the basis of what type of investment it is, but rather on a subjective measure of how risky the investment is. For example, all new investments in a company could be divided into high risk investments with a risk premium of 9 per cent; moderate risk investments, with a risk premium of 6 per cent; low risk with a risk premium of 3 per cent; and finally those investments with zero risk which are discounted at the company cost of borrowing.

The *CAPM approach* provides a theoretically correct, comprehensive approach to *risk-adjusted RRR* determination. However, the model's assumptions have been criticised as unrealistic and it is complex to use and relies on the availability and accuracy of much information which is external to the organisation

Illustration 67.

A publishing house has brought out a new monthly magazine which sells at ₹25 per copy. The cost of production is ₹20 per copy. A news stand estimates the sales pattern of the magazine as under:

Demand copies	Probability
0 < 200	0.18
200 < 400	0.32
400 < 600	0.25
600 < 800	0.15
800 < 1000	0.06
1000 < 1200	0.04

The news stand has contracted for 500 copies of the magazine per month from the publisher. The unsold copies are returnable to the publisher who will take them back at cost less ₹ 2 per copy for handling charges.

The news stand manager wants to simulate the pattern of demand and profitability. The following random number may be used for simulation:

27	15	56	17	98	71
51	32	62	83	96	69

You are required to:

- (i) Allocate random numbers to the demand pattern forecast by the news stand.
- (ii) Simulate twelve months sales and calculate the monthly and annual profit / loss.
- (iii) Calculate the loss on loss on sales.

Solution:

(a) Profit per copy of the magazines = $25 - 20 = ₹ 5$. If unsold copy is returned, loss per copy = ₹ 2.

(i) Allocation of Random Numbers

Demand probability	Probability allocated	Cumulative	Random Nos.
0 < 200	0.18	0.18	00 - 17
200 < 400	0.32	0.50	18 - 49
400 < 600	0.25	0.75	50 - 74
600 < 800	0.15	0.90	75 - 89
800 < 1000	0.06	0.96	90 - 95
1000 < 1200	0.04	1.00	96 - 99

(ii) Simulation of monthly pattern of demand and profitability

Month Numbers	Random	Demand copies	Sales copies	Returned sales	Profit on return	Net profit/loss	Lost sale copies	Loss
					₹		₹	₹
1	27	300	300	200	1,500	400	1,000	-
2	15	100	100	400	500	800	(300)	-
3	56	500	500	-	2,500	-	2,500	-
4	17	100	100	400	500	800	(300)	-
5	98	1100	500	-	2,500	-	2,500	600
6	71	500	500	-	2,500	-	2,500	-
7	51	500	500	-	2,500	-	2,500	-
8	32	300	300	200	1,500	400	1,500	-
9	62	500	500	-	2,500	-	2,500	-
10	83	700	500	-	2,500	-	2,500	200
11	96	1100	500	-	2,500	-	2,500	600
12	69	500	500	-	2,500	-	2,500	-
					24,000	2,400	21,600	1,400

(ii) Loss due to lost sales = 1400 copies $\times$ ₹ 5 = ₹ 7,000

Illustration 68.

A company manufacture 30 items per day. The sale of these items depends upon demand which has the following distribution:

Sales (Units)	27	28	29	30	31	32
Probability	0.10	0.15	0.20	0.35	0.15	0.05

The production cost and sale price of each unit are ₹ 40 and ₹ 50 respectively. Any unsold product is to be disposed off at a loss of ₹ 15 per unit. There is penalty of ₹ 5 per unit if the demand is the demand is not met.

Using the following random numbers estimate total / loss for the company for next 10 days: 10, 99, 65, 99, 95, 01, 79, 11, 16, 20



If the company decides to produce 29 items per day, what is the advantage to the company?

Solution:

Alignment of Random Numbers

Sales (Units)	Probability	Cumulative probability	Random numbers assigned
27	0.10	0.10	00 - 09
28	0.15	0.25	10 - 24
29	0.20	0.45	25 - 44
30	0.35	0.80	45 - 79
31	0.15	0.95	80 - 94
32	0.05	1.00	95 - 99

Let us now simulate the demand for next 10 days using the given number in order to estimate the total profit /loss for the company. Since the production cost each item is ₹ 40 and sale price is ₹ 50,

therefore the profit per unit of the sold item will be ₹ 10. Therefore is a loss of ₹ 15 per unit associated with each unsold unit and penalty of ₹ 5 per unit if the demand is nit met. Accordingly, the profit/loss for next ten days are calculated in column (iv) of the table below if the company manufacture 30items per days.

Day	Random number	Estimated Profit/Loss per day when sale production = 30 items per day		Profit/Loss per day when production = 29 items per day
1	10	28	$(28 \times 10) - (2 \times 15) = 250$	$(28 \times 10) - (1 \times 15) = 265$
2	99	32	$(30 \times 10) - (2 \times 5) = 290$	$(29 \times 10) - (3 \times 5) = 275$
3	65	30	$(30 \times 10) = 300$	$(29 \times 10) - (1 \times 5) = 285$
4	99	32	$(30 \times 10) - (2 \times 5) = 290$	$(29 \times 10) - (3 \times 5) = 275$
5	95	32	$(30 \times 10) - (2 \times 5) = 290$	$(29 \times 10) - (3 \times 5) = 275$
6	01	27	$(27 \times 10) - (3 \times 15) = 225$	$(27 \times 10) - (2 \times 15) = 240$
7	79	30	$(30 \times 10) = 300$	$(29 \times 10) - (1 \times 5) = 285$
8	11	28	$(28 \times 10) - (2 \times 15) = 250$	$(28 \times 10) - (1 \times 15) = 265$
9	16	28	$(28 \times 10) - (2 \times 15) = 250$	$(28 \times 10) - (1 \times 15) = 265$
10	20	28	$(28 \times 10) - (2 \times 15) = 250$	$(28 \times 10) - (1 \times 15) = 265$
Total Profit			₹ 2695	₹ 2695

The total profit for next 10 days will be ₹ 2695 if the company manufacture 30 items per day. In case, the company decides to produce 29 items per day, then the profit of the company for next 10 days is calculated in column (v) of the above table. It is evident from this table that there is no additional profit or loss if the production is reduced to 29 items per day since the total profit remains unchanged i.e ₹ 2695.

Illustration 69.

A company uses a high grade raw material. The consumption pattern is probabilities as given below and it takes two months to replenish stocks:

Consumption per month (tons)	1	2	3	4
Probability	0.15	0.30	0.45	0.10

The cost of placing an order is ₹1,000 and the cost of carrying stocks is ₹ 50 per month per ton. The average carrying costs are calculated on the stocks held at the end of each month.

The company has two options for the purchase of raw materials as under :

Option I. Order for 5 tons when the closing inventory of the month plus outstanding order is less than 8 tons.

Option II. Order for 8 tons when the closing inventory of the month plus outstanding order is less than 8 tons.

Currently in 1st April 2002, the company has a stock of 8 tons of raw materials plus 6 tons ordered two months ago. The order quantity is expected to be received next month.

Using the random numbers given below, simulate 12 months consumption till 31-3-2003 and advise the company as to which purchase option should be accepted such that the inventory costs are minimum.

Random numbers are : 88, 41, 67, 63, 48, 74, 27, 16, 11, 64, 49, 21

Solution:

Demand (Tons)	Probability	Cumulative Probability	Random Nos. allocated
1	0.15	0.15	00 - 14
2	0.30	0.45	15 - 44
3	0.45	0.90	45 - 89
4	0.10	1.00	90 - 99

Option - I

RN	Demand	Opening Stock	Receipts	Closing Stock	Op. Stock on Order	Order	Cl. Stock on Order
88	3	8	-	5	-	-	6
41	2	5	6	9	-	-	-
67	3	9	-	6	-	5	5
63	3	6	-	3	5	-	5
48	3	3	-	0	5	5	10
74	3	0	5	2	5	5	10
27	2	2	-	0	10	-	10
16	2	0	5	3	5	-	5
11	1	3	5	7	-	5	5
64	3	7	-	4	5	-	5
49	3	4	-	1	5	5	10
21	2	1	5	4	5	-	5
				44			



(₹)

No. of order placed 5 Ordering cost (5×1000)	5,000
Closing stock 44 Carrying cost (44×50)	2,200
Total Cost	7,200

Option - II

RN	Demand	Opening Stock	Receipts	Closing Stock	Op. Stock on Order	Order	Cl. Stock on Order
88	2	8	-	5	-	-	6
41	2	5	6	9	-	-	-
67	3	9	-	6	-	8	8
63	3	6	-	3	8	-	8
48	3	3	-	0	8	-	8
74	3	0	8	5	-	8	8
27	2	3	-	3	8	-	8
16	2	3	-	1	8	-	8
11	1	1	8	8	-	-	-
64	3	8	-	5	-	8	8
49	3	5	-	2	8	-	8
21	2	2	-	0	8	-	8
47				47			

(₹)

No. of order 3 Ordering cost (3×1000)	3,000
Closing stock 47 Carrying cost (47×50)	2,350
Total	5,350

Analysis: Since the cost of inventory is less in Option II, it is suggested to implement.

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