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RESEARCH BULLETIN

THE INSTITUTE OF COST ACCOUNTANTS OF INDIA

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The CMA professionals would ethically drive enterprises globally by creating value to stakeholders in the socio-economic context through competencies drawn from the integration of strategy, management and accounting.

Vision Statement

The Institute of Cost Accountants of India would be the preferred source of resources and professionals for the financial leadership of enterprises globally.

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Chairman - Research, Journal & IT Committee
The Institute of Cost Accountants of India
12 Sudder Street, Kolkata 700016

Foreword

Greetings!!!

It gives me an immense pleasure to present before you the Research Bulletin, Vol.43, No. I, April 2017 issue on the theme topic "Contemporary Issues in Securities Markets" in association with National Institute of Securities Markets (NISM), an educational initiative of SEBI.

Securities markets in any nation play a crucial role in the growth of economy and meeting the country's socio-economic objectives. They are an imperative constituent of the financial system given their role in the financial intermediation process and capital formation of the country. The significance of capital markets cannot be under-emphasized for a developing economy like India which needs considerable amount of capital for development of strong and sustainable infrastructure.

In the last decade, comprehensive developments have taken place in the capital market. These have impacted the issuers, the intermediaries as well as the investors. New challenges emerge almost on a daily basis. These are substantially fuelled by the huge rewards that the capital market has the potential to offer compared to any other form of investment. At the same time, wrong investment decisions can lead to huge losses too. As such, this market requires considerable skill and expertise, and a higher-than-normal risk profile.

It is an exemplary Research journal consisted of articles of blazing issues related to securities markets and I believe you will enjoy reading it and find extremely beneficial towards enriching your knowledge base.

Finally, my sincere gratitude to all the contributors for all their efforts made to publish this issue on time.

CMA Manas Kumar Thakur
President
The Institute of Cost Accountants of India

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Message from Director – NISM

Dear Professional Colleagues,

NISM is extremely pleased to be associated with The Institute of Cost Accountants of India for the third successive year, through the joint endeavour of the National Seminar on Capital and the special edition of the Research Bulletin.

In 2015, the theme was governance and reforms; in 2016, the horizon was extended to SMEs and start-ups. The proposed theme for 2017 is 'going beyond equities' is significant. During the Prime Minister Shri Narendra Modi's visit in December 2016 to NISM for inaugurating the new campus at Patalganga-Maharashtra, he had expressed a desire for securities markets to cover areas such as corporate bonds, municipal bonds and make the markets useful to the farming community. True to this spirit, the theme: Going Beyond Equities seeks to ignite the spark on topics such as has laid emphasis on Corporate Bonds, Green Bonds, Masala Bonds, Municipal Bonds, Agricultural Commodities etc.

Significantly, as the banking sector introspects on its own NPA problems, corporate India has quietly accessed the markets and raised more funds through bonds than the lending by the banking systems. India was an active participant in Paris COP21 meet, and from 2015 onwards, Green Bonds have been issued by Indian companies both in India and in overseas market. Besides climate sensitivity, it helps issuers to save valuable basis points in the borrowing costs and also enable investors to attain their goals of socially responsible investing. With the growing stability of the Indian Rupee, Indian corporations are also issuing Rupee-denominated bonds, a.k.a. Masala Bonds, thereby protecting their balance sheet liabilities and transferring the currency risk to the foreign investors, with some measure of success. Established municipal corporations and select smart cities have also begun to exhibit financial independence by tapping the Municipal Bond markets, with several capital market veterans like SBI Caps entering this line of business. The commodity markets and the commodity derivative markets are likely to become more efficient with the electronic connectivity through e-NAM and better regulation, as well as reduction of information asymmetry.

Each of these developments reflect a broad-basing of the reform process, going beyond equities.

On behalf of NISM, I wish the National Seminar 2017 a grand success. It is hoped that the publication of this volume spurs further thought and action towards the desired direction in the development of India and its surrounding region.

Sandip Ghose

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Chairman's Communiqué

Greetings!!!

Improvement in Capital market is indispensable for the economic growth of a country. The objective of economic activity in any country is to promote the well-being and standard of living of its people, which depends upon the distribution of income in terms of goods and services in the economy. For the growth process in the economy, production plays a crucial role. Production of output depends upon material inputs, human inputs, and financial inputs.

The proper availability and utilization of these inputs promotes the economic growth of a country. The financial inputs, among other sources, emanate from the capital market system. The capital market thrives with investors' confidence based upon their return on investment as well as from estimated capital appreciation from their investment. Unless the interests of investors are protected, raising of capital would be difficult. An efficient capital market should, therefore, provide a mechanism for efficient raising capital as well as have adequate safeguards to protect the interests of the investors.

Thus, I feel delighted to present before you Research Bulletin, Vol.43, No. I, April 2017 issue on the theme topic "Contemporary Issues in Securities Markets" in association with National Institute of Securities Markets (NISM), an educational initiative of SEBI. I believe this issue would evoke awareness and enhance knowledge base of the readers.

I take this opportunity to express my gratitude for my fellow members of the Research and Journal Committee, esteemed members of the Editorial Board, the eminent contributors and the entire research team of the Institute for their sincere effort to publish this volume in time.

Lastly, I express my sincere thanks to National Institute of Securities Markets (NISM) for associating with us to publish this volume and arranging for the joint Seminar on "Capital Markets - Thinking beyond Equities".

Wish the seminar a grand success.

CMA Avijit Goswami
Chairman, Research, Journal & IT Committee
The Institute of Cost Accountants of India

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Editor's Note

Greetings!!!

In the Indian scenario, efforts were made right since Independence, to create a healthy and efficient capital market through legislative measures. The Capital Issues (Control) Act, 1947 was the first piece of legislation passed in India to control the capital market. Subsequently, The Companies Act was enacted in 1956 and revised again in the year 2013. A capital market is a market for securities where business enterprises and governments can raise long-term funds. Financial regulators, such as SEBI and RBI regulate and oversee the capital market in their designated jurisdictions to ensure an orderly development of the market and protection of investors.

Securities and Exchange Board of India (SEBI) has given priority to the development, promotion and regulation of the capital market and to investor protection. It strongly believes that investors are the backbone of the capital market as they are the providers of the capital for the economic growth of the country and also are the fulcrum around which the trading in securities takes place. SEBI has laid down guidelines for almost all constituents of the capital market-from issuers on one hand to stock exchanges on the other hand and all other intermediaries like stock brokers, merchant bankers and underwriters. It also regulates the intermediary fund managers like mutual funds, portfolio managers and collective investment schemes.

Thus it is our noble endeavour to bring forth the Research Bulletin, Volume 43, No. I, April 2017 issue on the theme topic "Contemporary Issues in Securities Markets", an offering of the Directorate of Research & Journal of the Institute in association with National Institute of Securities Markets (NISM), an educational initiative of SEBI to enhance the knowledge base of readers and help investors in efficient decision-making in their investment mechanism.

We publish both theme based and non theme based articles on the contemporary issues. Inputs are mainly received both from academicians and the corporate stalwarts. Our attempt is to draw attention towards environmental, social, economical and market-related issues, so that the researchers and decision-makers can enrich their knowledge base and can take strategic decisions deliberately.

We are extremely happy to convey that our next issue of Research Bulletin, Vol.43, No. II would be published in July, 2016.

Further, it gives me an immense pleasure to inform you that our esteemed Research Bulletin has been enlisted in the UGC (University Grants Commission) approved journal list.

We look forward to constructive feedback from our readers on the articles and overall development of the Research Bulletin. Please mail us at: research.bulletin@icmai.in. We express heartfelt gratitude to all the contributors and reviewers of this important issue and wish our readers get plenty of academic inputs from the articles.

We feel honoured and privileged to get associated with National Institute of Securities Markets (NISM), an educational initiative of SEBI, and express my thankfulness to them for their whole-hearted support.

CMA (Dr.) Debaprosanna Nandy
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A STUDY OF ASSOCIATION BETWEEN MARKET VALUE ADDED AND EARNING-BASED MEASURES (EBM) VIS-À-VIS VALUE-BASED PERFORMANCE MEASURES (VBM) - AN EMPIRICAL STUDY OF BSE SENSEX COMPANIES

Avijit Sikdar

Abstract:

Investors are interested in assessing the corporate financial performance that correlate with shareholders' wealth maximization, measured by the market price of share. Traditional earning-based performance measures like return on investment, earnings per share, etc., have been used as the most important indicators for measuring the corporate performance. But the insufficiency and somewhat irrelevancy of accounting based performance indicators have given rise to the need of alternative performance indicators. The value-based performance indicators is an answer to the limitations of traditional accounting based performance indicators. There are several value based measures such as Economic Value Added (EVA), shareholder Value Added (SVA) and Cash Value Added (CVA).

This paper attempts to examine empirically the relevance and association between Market value added and value based performance indicators versus traditional earning based performance indicators and their interrelationship with reference to Indian companies. In this paper we also study Incremental information content of value-based

performance indicators over earning -based performance indicators. We have selected all the non-financial and non-banking companies Listed in the Bombay Stock Exchange (BSE) and forming part of Sensex. The study period covers 16 years from 31st March 2000 to 31st March, 2015. This study strongly indicates that Value-based indicators are superior to the traditional performance measures in its association with market value of shares.

The finding of the study of association between Market Value Added and earning-based performance measures indicates that the variation of MVA is not strongly explained by the Earning-based performance Indicators. The outcome of the study of association between Market Value Added and Value-based performance measures indicates that EVA and SVA are strongly related with MVA variation. CVA is not showing strong association with MVA. Although, on overall basis we can conclude that the variation of MVA is significantly explained by the Value-based performance Indicators. The results of the study of relationship between two sets of performance indicators, reveals that the relationship between value-based performance indicators and earning-based indicators is moderate. Incremental information content test show that Value-based performance indicators give positive incremental information to explain the variation of shareholder's wealth, measured by Market Value Added, when they are added with traditional earning-based performance indicators for all the companies. On overall basis we can generalize that the value-based performance indicators could better capture the stock market reality than the traditional accounting earning based performance indicators.

Key Words:

Economic Value Added (EVA), Cash Value Added (CVA), Share holders' Value Added (SVA), Earning per Share(EPS), Return on Assets(ROA)

1.1 Introduction

Investors are interested in assessing the corporate financial performance that correlate with shareholders' wealth maximization, measured by the market price of share. Traditional earning-based performance measures like return on investment, earnings per share, etc., have been used as the most important indicators for measuring the corporate performance. But the insufficiency and somewhat irrelevancy of accounting based performance indicators have given rise to the need of alternative performance indicators. The value-based performance indicators is an answer to the limitations of traditional accounting based performance indicators. In this study we want to focus the relative information content and Incremental information content of value-based performance indicators over earning -based performance indicators. In recent years, value based measures which measure performances in terms of change in value have received a lot of attention. There are several value based measures such as Economic Value Added (EVA), shareholder

Value Added (SVA) and Cash Value Added (CVA).

The traditional accounting earning based indicators are used to follow-up a company's profitability and value creation. These indicators are inconsistent with the capital market's mechanism, and seem to be far away from the way the market considers and determines value. That is why we have proposed in this research paper to test the efficiency and effectiveness of Value-based performance indicators as a new platform for assessment of corporate performance and value creation. Value-based performance indicators would no way replace the traditional accounting system. Accounting profit will still be used to calculate tax and to control the company from the legal perspective. Inside companies, to understand and manage our business, we should focus on value-based performance indicators and should not depend only on accounting based performance indicators.

1.2 Review of Literature

Stern Stewart & Company, a global management consultancy firm, has developed the concept of Economic Value added (EVA) to measurement of corporate performance. EVA should be used as a measure of both internal and external performance. EVA is a useful tool that could combine factors such as economy, accounting and market information in its assessment. It could incorporate much more information as compared to traditional tools, i.e., Earning per share, Dividend per share, Net operating profit after tax etc. The empirical research of academics till date on this subject is limited. The results of these studies are mixed. Many studies have shown the advantage of using EVA over the traditional tools for assessing corporate performance. Economic Value Analysis (EVA), developed by Stern Stewart & Co., New York and other challengers like Cash Value Added (CVA) and Shareholder value added (SVA) developed by Ottoson and Weissenrieder (1996) and Cash Flow Return on Investment (CFROI) by Madden (1998) are number of Value-based Management Frameworks. A number of empirical research studies have been undertaken by researchers to explain the variations in shareholders' wealth through traditional performance measures as well as applying the newest evaluation metric, EVA. Thus, a number of studies have been conducted in India and abroad with a view to study the comparison regarding the application of EVA with traditional performance measures like Return on capital employed, Cash value added, Cash flow return on investment, Earning per share etc. in different companies. A brief overview of such studies and research papers is being presented below.

- **Biddle (1996)** tested assertions that Economic Value Added (EVA) is more highly associated with stock return and firm values than accrual earnings, and evaluated which components of EVA, if any, contribute to these associations. The study has used a sample of 6174 firm-years representing both adopters and non-adopters of EVA over the period 1984 to 1993. The study provided independent empirical evidence on the information content of EVA, Residual Income (RI) and two mandated performance measures, earning and cash flow operations. The correlation and regression test revealed that earnings were more highly associated

with return and firm values than EVA, RI, or cash flow from operations. The results suggested that EVA components add only marginally to information context beyond earnings.

- **Lehn and Makhija (1996)** examined the effectiveness of EVA and Market Value Added (MVA) as a measure of performance and as a signal of strategic change. The study has used the data of 241 large US companies for the period 1987-1996 and analyzed through descriptive statistics and multiple correlation. The results show that EVA and MVA effectively measured the quality of strategic decisions and served as signals of strategic change. They were found to be significantly correlated with stock price performance and inversely related to turnover. Firms having greater focus in their business activities have higher MVA than less focused counterparts.

- **O'Byrne (1996)** tested the explanatory power of capitalized EVA, Net operating profit after tax, free cash flows relative to market value divided by invested capital. The study has made two adjustments to the original model of Stern and Stewart for the period started from 1985 to 1993. To test the usefulness and to compare the explanatory power of the EVA models with NOPAT, FCF and capital models, the author used nine years of data and the total sample included 9000 largest publicly traded companies. The results were analyzed with the help of descriptive statistics and regression model. The findings showed NOPAT and EVA have almost the same explanatory power. He concluded that the EVA has correlation with the market value and acts as a powerful tool for understanding expectations of the investor.

- **Chen and Dodd (1997)** reviewed that EVA is the most recent and exciting innovation in company performance measures. The study examined the EVA performance of 656 US companies and compared the information usefulness of EVA with accounting earnings and residual income through co-efficient of correlation. The results show that EVA was more powerful than traditional measures of accounting profit in explaining stock return. They also found that Economic Value Added was not only similar to Residual Income in concept, but also empirically comparable.

- **Lehn and Makhija (1997)** evaluated the degree of correlation between different performance measures like RI, EVA, accounting earnings with stock returns. A sample consisted of 452 large US companies from the Stern Stewart Performance 1000 database during the period 1985-1994 and found that EVA and MVA were significantly and positively correlated with stock price performance than conventional accounting performance measures. The results show that stock returns, EVA and MVA were significantly determinant of CEO turnover, whereas conventional accounting performance measures were less important determinant of CEO turnover.

- **Weissenrieder (1997)** discussed a new economic framework known as Value Based Management Framework that better reflects opportunities and

pitfalls. He added four major frameworks within Value-based Management, i.e., EVA, Cash Value Added (CVA), Cash Flow Return on Investments (CFROI), and Shareholder Value Analysis (SVA). The paper mainly deals with two concepts, i.e. EVA and CVA by taking an example of CVA and EVA calculation for eleven years data from the year 1989 to 2000 of Sweden companies. He further compared EVA to CVA and discussed the final corrections that were necessary to eventually have EVA become a concept that stimulates cash flow. He found that EVA might provide the company with slightly better analyses but the quality will be far away from what it will be, if the ambition is set higher than what realistically can be achieved with EVA.

- **Chen and Dodd (1998)** presented the evidence on the value relevance of three profitability measures: Operating income (OI), RI, and EVA. They found that all three profitability measures have information content in terms of value-relevance. They also examined and compared EVA and other profitability measures in terms of their association with stock returns. The sample size consists of 1000 leading U.S. companies over a ten year period and results were tested with the help of correlation and regression analysis. The results advocated that EVA is the best measure of a firm's intrinsic value. There was no convincing evidence to support the prediction that residual income provides more information that operating income in explaining security returns.

- **Anand et al. (1999)** evaluated EVA as a business performance measure of shareholder value. The variables used in this study were: Refined Economic value added 9REVA), EVA, MVA, Profit after tax (PAT) etc. The relationship between ranks based on four criterion variables for companies like Infosys, ONGC, Bajaj Auto etc. were studied by using Spearman's rank correlation co-efficient for five years from 1994 to 1998. The results showed that there was a high degree of positive correlation between PAT and MVA. They found that EVA, REVA and MVA were better measures of business performance in terms of shareholder value creation and competitive advantage of a firm.

- **Biddle et al. (1999)** linked the underlying concept of residual income to shareholder value. They discussed how Stern Stewart modified residual income to produce its proprietary EVA metric. They compared EVA with residual income, net income and operating cash flows over the period 1988-97. Then they examined the claim that EVA was more closely associated with stock returns and firm value than net income. The evidence indicated that EVA does not dominate net income in association with stock returns and firm values. The study also examined a second claim that compensation plans based on residual income motivate managers to take actions consistent with increasing shareholder value. Here, the independent evidence suggested that managers do respond to residual income-based incentives. Finally, they discussed how a metric such as EVA can be useful for internal incentive purposes even if it conveyed little news to market

participants regarding the firm's valuation. The findings support a pre-condition for shareholder wealth creation by confirming that managers respond to residual income-based incentives.

- **Banerjee (2000)** examined whether the market value of a firm is best predicted by expected EVA. The sample size considered for the present study was 200 companies; and the relationship between EVA and market value was tested over a five-year period data, i.e., 1993-94 to 1997-98. The companies were selected from mature as well as growing industries. In this study, EVA, Adjusted Return on Net worth (ARONW), EPS, Capital productivity, Labour productivity were considered as independent variables; and MVA was considered as dependent variable, tested in nine industries. The linear regression was drawn to establish the relationship between EVA and Market value. The study could only show that EVA was the best out of five independent variables. The study also found that market value of most of the firms in the sample was explained more by current operational value than future growth value of firms.

- **Ramana (2006)** in his study he examines the relationship between MVA and EVA of the Indian companies. Though the focus of the paper is the relationship between EVA and MVA, it also tries to understand the relationship between MVA and other common accounting numbers like NOPAT, PAT, PBIT, and CFO. The study indicates that there is no strong evidence to support Stern Stewart's claim that EVA is superior to the traditional performance measures in its association with MVA.

- **Wibowo & Berasategui (2008),** in their research paper examine the association between Economic Value Added and Market Value Added (MVA) with the reported profit. The study was based on 40 listed companies in Indonesian stock exchange for the study period 2004 to 2007. This study found evidence in the relationships between EVA and MVA with reported earnings. However, MVA is more significant in explaining its relationship with reported earnings than EVA. Therefore, there is still not enough evidence that EVA can be used to explain the reported earnings effectively other than MVA.

- **Chandra(2009),** In his paper, effort has been made to explain theoretical foundation of EVA and SVA with its genesis, definition, calculation, adjustments required, scope and some other related issues. The methodology used is a type of theoretical mining of logics resulting a step-by-step process required for implementation of value-Based measures. As corporate sectors are planning to move from traditional to value based performance measures, EVA and SVA would yield good result and the paper may become helpful to them to understand the methodology.

- **Visaltanachoti, Luo and Yi Yi (2009)** they explore the benefits of EVA by comparing its information content in explaining 90 sector returns with the information content of three traditional accounting - based performance measures: cash flow from operations (CFO), earnings (EBIT), and residual

income (RI). The data used for the study based on 7000+ companies in USA for the reporting period 2003 -2008). Their findings show that the association between traditional accounting performance measures and sector returns is higher than that with EVA.

- **Bernier and Mouelhi (2011), in their research study they have** examine the linkages between a firm's market value added (MVA) per share, a measure of its external performance, and earning-based performance measures on a sample of 24 firms from the U.S. insurance industry over the period 1991-2004 to study the relationship between MVA and the following five internal performance measures: earnings per share (EPS), free cash flow per share (FCF), economic value added per share (EVA), return on assets (ROA) and return on equity (ROE). Our main results show that cointegration between MVA and EVA as well as between MVA and ROA are the two more statistically powerful relationships.

- **Khan, Chouhan, Chandra and Goswami (2012),** in their research paper empirically examined whether Economic Value Added of the companies listed in BSE securities market creating value for shareholders. For this purpose a sample from BSE-30 companies is taken. The statistical test will be done with multiple correlation and multivariable linear regression model. The company's profitability, size (net worth), growth ability's (sales growth) influence on EVA is checked. The paper concludes with the possible reasons and advice at the end in order to increase the company's EVA and indicates that profitability is an important factor for creating value in BSE-30 companies.

- **Niresh & Alfred (2014),** in their study MVA has been used as the measure of shareholder wealth creation. Leverage and EVA have been considered as the independent variables whereas. The data used for the study are 6listed private bank in Srilanka for the study period 2011 to 2013. Correlation and regression have been utilized to find out the effects of leverage and EVA on MVA. The findings showed that both EVA as well as leverage has no strong impact on Market Value Added of the selected listed private banks in Sri Lanka.

- **Reddy (2014)** studies financial performance using Market Value Added Approach in selected ten software companies in South India for one year period 2010 - 2011. The study examined that variables like RONW, CAP, EPS, EVA, ROS, ROTA and Cash Profit are found significant effect on MVA

- **Prasad and Srimal (2015)**, in their paper they study the relationship between financial measures and MVA. Here MVA is taken as a dependent variable and the profitability ratio (GPM, NPM, ROCE, ROE and RONW) and market value ratios (EPS, PER and DPR) variables are selected as independent variables. Sample of 23 listed Indian infrastructural companies of CNX Infrastructure Index have been taken for the study. The period of the study covers accounting period 2009-10 to 2013-14. The study reveals that there is positive relationship between MVA and financial performance measures of selected infrastructural companies

during the period. Result shows that there is significant relationship between ROCE, ROE AND EPS WITH MVA.

From the review of literature above, we can identified that, there is significant research gap in the study of relationship between market value added and value-based performance measures in form of cash value added and shareholders' value added. Few studies have taken place in India to study the association between earning-based performance measures and SVA as well as CVA. In this connection the propose study will bridge the research gap.

1.3 Objective of the Study

The central objective of the study is to determine the degree of association between market value of shares and value-based measures vis-à-vis accounting earning based measures. More specifically, the major objectives of the study are:

1. To identify the relationship between market value of shares and accounting earnings based measures.
2. To determine the degree of association between market value of shares and value-based performance measures.
3. To find out the relationship between accounting based measures and value-based measures.
4. Incremental information content of value-based measures over traditional earning-based measures.

1.4 Research Methodology

The objectives of the study have been achieved with the following hypothesis and methodology.

Hypothesis of the Study

Part A: The degree of association between market value added and accounting earnings based measures.

H_0: There is no significant linear relationship between market value added and traditional accounting earning based performance measure.

Part: B The degree of association between market value added and value-based performance measures.

H_0: there is no significant linear relationship between market value added and Value-based performance measure.

Part C: The relationship between accounting based measures and value-based measures

H_0: There is no significant linear relationship between value-based performance measures and traditional earning based performance measures.

Part D: Incremental information content of value-based measures over traditional earning-based measures

H_0: value-based performance indicators adds not more information content beyond the Accounting earning-based performance indicators like ROA and EPS to explain the variation in MVA.

Sample selection

For present research purpose, we have considered all the non-financial and non-banking companies listed in the Bombay Stock Exchange (BSE) and constituent of

Sensex and those have listed before 2000. Finally, 18 companies are identified for measuring the association between market value added and traditional earning-based performance measures vis-à-vis value-based performance measures.

Study period

The sample period is to cover financial years commencing from 1999-2000 to 2014-2015.

Data collection

The proposed research study, although will be mainly of empirical nature, but it will contain some conceptual aspects related to the empirical verification. For these parts, we would depend on books and journals available on these fields and related websites. However, for empirical purpose, we would depend mainly on published annual reports of sample companies and we would also utilize database of *Prowess*.

Research Tools

The data has been collected from published annual reports and prowess database; such data have been compiled, tabulated and arranged for the purpose of statistical analysis. A significant part of data has been analyzed by using suitable financial and statistical methods, and econometric techniques through the application computer packages SPSS 16.0 and Microsoft excel programs. In this study we use multiple regression analysis, correlation analysis, and simple Regression analysis using ordinary least square method. The coefficient is statistically tested by T test at 1% and 5% level of significance. The overall significance of Model is tested by F test at 1% and 5% level of significance.

1.5 Variables under study

A. Share Price Indicators

Market value added (MVA): Here we study the behaviour of share price, which reflects the variation of shareholders' wealth. Here it is measured by market value added (MVA) concept. Stewart (1991) defines MVA as the excess of market value of capital (both debt and equity) over the book value of capital. If the MVA is positive, the company has created wealth for its shareholders.

MVA = Total Market Value – Total Capital
= (MV of Stock + MV of Debt) – Total Capital

Where, MV of Stock = Market Capitalization = Shares Outstanding x Stock Price
MV of Debt = Book Value of Debt (as an estimate to the MV)

B. Accounting Earning-based Performance indicators

Return on Assets (ROA): The Return on Assets (ROA) is one of the important measures of performance evaluation of the company. The Return on Assets compares income with total Assets It can be interpreted in two ways.

1. It measures management's efficiency in using firm's assets to generate operating profits

2. It reports the total return accruing to all providers of capital.

The return is measured by net income prior to the cost of financing and is computed by adding back after tax interest expenses to net income.

$$\text{Return on Assets (ROA)} = \frac{\text{Net Income} + \text{After tax interest cost}}{\text{Average total Assets}} = \frac{\text{Net Income} + \text{Interest } (1-t)}{\text{Average total Assets}} = \frac{\text{NOPAT}}{\text{Average total Assets}}$$

Return on Equity (ROE): Common or equity shareholders are entitled to the residual profits. The rate of dividend is not fixed; the earnings may be distributed to the shareholders or retained in the business. Nevertheless, the net profits after tax represent their return. A return on shareholder's equity is calculated to see the profitability of owners' investment.

$$\textbf{ROE} = \frac{\textbf{Profit after Taxes}}{\textbf{Net worth (Equity)}} = \frac{\textbf{PAT}}{\textbf{Net Worth}}$$

Return on Capital employed (ROCE): The profitability of the firm can also be analysed from the point of view of the total fund employed in the firm. The Return on Capital Employed may be calculated as follows:

$$\text{ROCE} = \frac{\text{Net Profit After tax}}{\text{Average Capital Employed}} \times 100$$

However, there is a conceptual mismatch in the above formula. The figure of net profit after tax is a profit figure after deducting the interest on debts whereas the figure of capital employed in the denominator includes the long-term debts. Therefore, it would be better to adjust the amount of interest on long-term debts in the numerator in either of the following ways:

$$\text{ROCE} = \frac{\text{Net Profit After tax} + \text{interest } (1-t)}{\text{Average Capital Employed}}$$

Earnings per Share (EPS): The phrase "earnings" in finance is referred to net profit, that is, after tax profit. Earnings Per Share equals simply to the total net profit (earnings) divided by the total number of shares. When the company publishes what proportion of its profits will be paid out as dividend to the stockholders, then the higher the EPS is the better, since than more dividends will be received after each shares owned. There are two types of EPS in use of Financial Statement.

1. $\text{Basic EPS} = \frac{\text{Net Profit} - \text{Pref Dividend}}{\text{Number of outstanding Equity Shares}}$

2. Diluted EPS = $\frac{\text{Net Profit After adjustment for diluted earnings to Euity}}{\text{Outstanding and Potential Equity Shares}}$

C. Value –based Performance Indicators

Economic Value Added (EVA): The Economic Value Added (EVA) metric is a quantitative technique to evaluate a firm's financial performance. Any surplus generated from operating activities over and above the cost of capital is termed as Economic Value Added (EVA). Operationally, a firm's EVA is the excess of after tax operating profits over the required minimum rate of return that the investors could get by investing in securities of comparable risk.

EVA = NOPAT – (WACC × TC)

Where NOPAT = Net Operating Profit After Tax i.e., Profits after depreciation and taxes but before interest costs.

WACC = Weighted Average Cost of Capital expressed in %

TC = Total Capital Employed.

Cash Value Added (CVA): CVA is Cash Value added as another indicator of company's performance in the context of value creation over the reporting period. This concept was developed by Swedish consulting company. Valuation based this concept reflects the real increase in company's value over reporting period in cash flow term.The model presented here is called the Cash Value Added (CVA) model and is, in its design, very simple. It is the excess of operating cash flow over the cost of capital of the company.

(1) Direct calculation:
CVA = Operating cash flow- Capital Charge
Capital charge = cost of capital (WACC) x capital employed/gross investment

(2) Indirect calculation:
CVA= (CFROI- Cost of Capital) * Gross Investment

Shareholder Value Added (SVA): Shareholder value added (SVA) is the redefined version of Economic value added. In case of EVA we calculate overall cost of capital and included in the performance measurement indicators, by deducting it from the net operating profit after tax (NOPAT). There we should not consider the leverage effect of debt capital financing. In EVA calculation we not segregate between equity finance and non equity finance. We take total capital charges to calculate the surplus company generated over it's after tax operating profit.

SVA = Net Income(PAT) – Cost of Equity(K_e)*net worth

1.6 Findings and results

The results of multiple regression analysis of panel data taking 18 Indian listed companies in BSE, constituent of SENSEX , and study period 1999-2000 to 2014-15 i.e 18 x16 = 288 sets of data are discussed in the following paragraphs.

Part A: The degree of association between market value added and accounting earnings based measures.

The result show that among the various determinants of value addition of share holders' wealth, only the EPS and the ROA appear to be positive and statistically significant in relation to explain the variation in MVA of Indian companies in the stock Market. Although, the estimated coefficients of two other variables (ROE and ROCE) have expected signs (as per our hypotheses), but they are not found statistically significant.

Table 1: Coefficients of MVA and EBM

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	159381	73342.94		2.173	0.031
ROA	15236.8	4493.458	0.551	3.391	0.001
EPS	2546.288	899.119	0.16	2.832	0.005
ROE	6729.93	6654.24	0.087	1.011	0.313
ROCE	15895.6	11524.9	0.578	1.379	0.195

Dependent Variable: MVA

The value of R^2 (Table 2) for the estimated model is nearly 0.165 which implies that four factors (explanatory variables) together explained nearly 16% of total variation in shareholder wealth. The computed value of R^2 is statistically significant, which is revealed by the significance of Computed-F value. The F test is applied here to test that all the slope coefficients in the model are simultaneously equal to zero. In the given company the value Computed-F is 15.178 (Table 2) and this is statistically significant at 1% level of significance. Suggesting that we can strongly reject the hypothesis that collectively all the explanatory variables have no impact on shareholder wealth creation (MVA). This indicates also the good quality of regression model.

Table 2: Model Summary of MVA and EBM

	Sum of Squares	df	Mean Square	F	Sig.	R Square	Adjusted R Square
Regression	1.57E+13	4	3.91E+12	15.178	.000b	0.177	0.165
Residual	7.27E+13	284	2.58E+11				
Total	8.84E+13	288					

Part: B The degree of association between market value added and value-based performance measures.

The results of multiple regression (Table 3) analysis show that among the various Value-based determinants of share holder wealth, EVA and SVA appear to be positive and statistically significant in relation to explain the variation of MVA in Indian stock Market. Although the estimated coefficient of other variable (CVA) has expected sign (as per our hypotheses), but, it is not found statistically significant.

Table 3: Coefficients of MVA and VBM

	Unstandardized Coefficients		*Standardized Coefficients*	*T*	*Sig.*
	B	*Std. Error*	*Beta*		
(Constant)	*192182.7*	*25066.55*		*7.667*	*0*
EVA	*10.182*	*0.994*	*0.708*	*10.249*	*0*
SVA	*20.215*	*1.964*	*0.423*	*10.292*	*0*
CVA	*0.672*	*0.893*	*0.054*	*0.753*	*0.452*

Dependent Variable: MVA

The value of R^2 (table 4) for the estimated model is nearly 0.58 which implies that three factors (explanatory variables) together explained nearly 58% of total variation in shareholder wealth. The computed value of R^2 is statistically significant, which is revealed by the significance of Computed-F value.

The F test is applied here to test that all the slope coefficients in the model are simultaneously equal to zero. In the given company the value Computed-F is 130.3 (5.21c) and this is statistically significant at 1% level of significance. Suggesting that we can strongly reject the hypothesis that collectively all the explanatory variables have no impact on shareholder wealth creation (MVA). This indicates also the good quality of regression model.

Table 4: Model Summary of MVA and VBM

	Sum of Squares	*df*	*Mean Square*	*F*	*Sig.*	*R Square*	*Adjusted R Square*
Regression	*5.13E+13*	*3*	*1.71E+13*	*130.372*	*.000b*	*0.58*	*0.576*
Residual	*3.71E+13*	*288*	*1.31E+11*				
Total	*8.84E+13*	*288*					

Part C: The relationship between accounting based measures and value-based measures

The objective was to test the hypothesis that there is no linear relation between value-based performance measures, like EVA, SVA and CVA and Earning based performance measures, like ROA, EPS, ROE and ROCE. Three tables are crafted to analyze the strength of

association of each value-based measure individually with respect to accounting based returns as ROA, EPS, ROE and ROCE using simple regression model. Here we use simple regression model to study the association.

The correlation between EVA and all the Accounting based indicators are positive and regression coefficients are not statistically significant at 5% level of significance except the regression coefficient of EPS (table 5) which is significant at 1%level of significance. Within the accounting based return the R and R^2 of EPS is the highest. The correlation i.e R between EVA and accounting based-return can be summarised as: EPS > ROA > ROE >ROCE.

Table 5: Association between EVA and EBM

			INTERCEPT			*SLOPE*		
DEP	***R***	***R^2***	***Value***	***t***	***Sig.***	***Value***	***t***	***Sig.***
ROA	*0.082*	*0.007*	*16495*	*3.141*	*0.002*	*440.3*	*1.38*	*0.168*
EPS	*0.180*	*0.034*	*14745*	*4.274*	*0.000*	*203.9*	*3.16*	*0.002*
ROE	*0.036*	*0.001*	*21207*	*5.582*	*0.000*	*68.37*	*0.601*	*0.548*
ROCE	*0.126*	*0.016*	*16469*	*4.326*	*0.000*	*194.494*	*2.146*	*0.033*

The correlation between SVA and all the Accounting based indicators are positive and all regression coefficients are statistically significant at 5% level of significance except the regression coefficient of ROA (table 6). Within the accounting based return the R and R^2 of EPS is the highest. The correlation i.e R between EVA and accounting based-return can be summarised as: EPS > ROCE > ROE > ROA.

Table 6: Association between SVA and EBM

			INTERCEPT			*SLOPE*		
DEP	***R***	***R^2***	***Value***	***t***	***Sig.***	***Value***	***t***	***Sig.***
ROA	*0.008*	*0.000*	*555.5*	*0.351*	*0.726*	*12.5*	*0.130*	*0.897*
EPS	*0.186*	*0.035*	*2152.2*	*2.075*	*0.039*	*62*	*3.204*	*0.002*
ROE	*0.112*	*0.013*	*2103.5*	*1.852*	*0.065*	*64.9*	*1.9*	*0.050*
ROCE	*0.174*	*0.030*	*3089*	*2.719*	*0.007*	*80.6*	*2.979*	*0.003*

The correlation between CVA and all the Accounting based indicators are positive and regression coefficients are not statistically significant at 5% level of significance except the regression coefficient of EPS (table 7) which is significant at 1% level of significance. Within the accounting based return the R and R^2 of EPS is the highest. The correlation i.e R between EVA and accounting based-return can be summarised as: EPS > ROA > ROE >ROCE.

Table 7: Association between CVA and EBM

			INTERCEPT			SLOPE		
DEP	R	R^2	Value	t	Sig.	Value	t	Sig.
ROA	0.03	0.001	25494	4.233	0.000	186.1	0.508	0.612
EPS	0.152	0.023	14892	3.744	0.000	192.9	2.597	0.010
ROE	0.026	0.001	24231	5.562	0.000	56.19	0.431	0.667
ROCE	0.019	0.000	21612	4.913	0.000	33.2	0.317	0.751

On overall basis we can state that all of the accounting-based indicators have positive association with value based measures but not all the regression coefficient are significant rather negligible in respect of **panel data regression analysis** the study period 2009-10 to 2014-15. We cannot reject the hypothesis and we can say that there is moderate association between two sets of performance measurement tools.

Part D: Incremental information content of value-based measures over traditional earning-based measures

In this section we shall study the incremental information content of the value-based performance indicators over accounting earning-based indicators to explain the variation of shareholders' wealth, measured by Market Value Added of **panel data**. The results of the models are discussed in the following sets of paragraphs.

- Our results about incremental information content test reveal that EVA add information value (0.394) substantially in explaining the market value added of the firm as compared to without considering EVA. Overall model results (as revealed by F statistics) are significant with statistically significant p value. Thus our first hypothesis that EVA adds more information content to that provided by traditional accounting earning-based indicators in explaining market value of the firm is accepted.

Table 8: Incremental Information content of VBM over EBM

Model	Independent Variables	R-squared	Adj. R^2	F	sig.	Increment
1	ROA, EPS,	0.041	0.034	6.046	0.003	
2	ROA, EPS & EVA	0.434	0.428	72.247	0	0.394
3	ROA, EPS & SVA	0.103	0.093	10.824	0	0.059
4	ROA, EPS & CVA	0.283	0.276	37.3	0	0.242

Dependent variables: Market value Added

- Our results about incremental information content test reveal that SVA add value (0.059) in explaining the market value added of the firm as compared to without considering SVA. Overall model results (as revealed by F statistics) are significant with statistically significant p value. Thus our

first hypothesis that SVA adds more information content to that provided by traditional accounting earning-based indicators in explaining market value of the firm is accepted.

- Our results about incremental information content test reveal that CVA add value (0.242) substantially in explaining the market value added of the firm as compared to without considering CVA. Overall model results (as revealed by F statistics) are significant with statistically significant p value. Thus our first hypothesis that CVA adds more information content to that provided by traditional accounting earning-based indicators in explaining market value of the firm is accepted.

Hence, our prime hypothesis that value-based performance indicators have added incremental information to explain the variation of market value added is accepted on overall basis. The summarised result of incremental information content is identified using adjusted R Squared is as follows: EVA > CVA > SVA.

1.7 Conclusion

This study reveals that traditional earning based performance indicators, except ROA and EPS, fails to capture the share price variation strongly. As an alternative, this paper suggests modern value-based performance measures, namely, EVA, CVA and SVA. These parameters have strong association with market value added (MVA). These parameters not being available from the annual reports, a stake holder may derive them from the annual report of the company and estimate the future market price. Outcome of the study shows that these value-based measures demonstrate an effective relationship with shareholder's wealth measured by market value added (MVA) and can explain variations in share price significantly. Panel data analyses give the similar outcome. The paper suggests that the listed companies should disclose these parameters in their annual report. This would help the investors take their investment decision. The relative information content and incremental information content of value-based performance indicators are significant. Hence, it can be concluded that disclosure of value-based measure is not supplementary to accounting earning based measure rather complementary to each other. In this information era, shareholders should have right to know the value addition by a company on its investment to evaluate its performance and value of their investments. The paper is, however, not devoid of limitations. They are as follows: First, the book value of capital invested was used as a measure of capital invested. Book value reflects accounting choices made over time and hence, calculation may not be absolutely accurate; Second, the study ignores the concept of economic depreciation while calculating the CVA; Third, linear methods have been used for analysis, although a non linear relationship among the variables may exist and Fourth, the accounting data used are based on pre IND-AS scenario. Further study can be conducted after implementation of IND-AS from the financial year 2015-16. Subject to these limitations, the paper is expected to be useful for the stakeholders of listed companies.

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Annexure 1

Accounting Earning-based and value-based Performance Indicators

COM	year	ROE(%)	ROCE(%)	EPS	ROA(%)	MVA (in million)	EVA(in million)	CVA(in million)	SVA(in million)
APL	Mar-00	27.72	31.87	24.4	14.44	13534	739.6242	453.075	-4.42503
APL	Mar-01	25.93	28.17	16.47	13.76	11731	686.2198	493.7712	-264.755
APL	Mar-02	28.2	37.99	17.88	15.67	17002	994.2277	656.5232	-148.525
APL	Mar-03	29.79	41.79	22	15.91	16421	1121.704	852.5813	-34.9186
APL	Mar-04	27.8	42.11	14.46	15	23825	1296.541	970.9209	47.83339
APL	Mar-05	30.32	44.61	17.69	15.3	31792	1530.705	1007.891	63.7732
APL	Mar-06	30.02	50.96	19.16	17.08	55554	1987.329	1201.089	-125.584
APL	Mar-07	36.56	50.67	27.93	18.41	65919	2517.309	1441.092	-327.466
APL	Mar-08	40.41	57.95	39.23	13.45	105814	3679.22	1855.967	-512.876
APL	Mar-09	33.11	50.97	36.77	12.39	64448	3634.684	1956.969	230.8498
APL	Mar-10	49.74	69.95	79.24	17.18	180354	7199.526	3509.688	-1218.18
APL	Mar-11	39.24	56.08	80.16	20.94	222631	7364.133	3575.637	-1506.03
APL	Mar-12	38.52	53.72	99.54	20.84	285686	8899.667	4106.089	-3963.15
APL	Mar-13	34.74	50.77	108.82	20.14	441166	10643.27	4748.021	-1735.03
APL	Mar-14	32.47	47.74	12.26	18.22	488193	11259.71	5255.628	-3425.29
APL	Mar-15	31.38	46.13	13.85	18.31	733449	12449.25	6057.338	-4361.04
BHEL	Mar-00	17.85	41.68	10.42	9.77	-2982	6823.361	6554.917	3399.452
BHEL	Mar-01	8.68	14.91	-20.3	6.67	-1262	11335.71	8091.231	6458.481
BHEL	Mar-02	11.09	24.41	5.47	6.94	-876	5616.653	5795.399	2833.871
BHEL	Mar-03	9.44	24.53	5.63	6.29	7598	5552.634	6486.549	2656.619
BHEL	Mar-04	12.47	29.26	6.87	7.24	95177	8997.661	9301.239	3521.356
BHEL	Mar-05	15.82	33.42	26.37	7.49	127560	10167.14	9244.619	1287.681
BHEL	Mar-06	23	41.57	56.22	9.19	476950	17246.35	11848.29	-181.867
BHEL	Mar-07	27.48	51.16	79.51	9.8	465458	24867.74	17754.42	4134.573
BHEL	Mar-08	26.54	54.61	46.66	8.87	898980	30558.31	21347.67	2570.565
BHEL	Mar-09	24.25	53.69	46.69	7.9	607021	33782.61	26404.44	6676.111
BHEL	Mar-10	27.08	52.2	34.56	10.74	1008552	55798.91	49379.85	24074.79
BHEL	Mar-11	29.83	62.82	103.3	11.15	807289	64774.62	40301.12	6901.22
BHEL	Mar-12	27.75	49.37	25.4	11.07	375179	60531.18	41095.56	7356.975
BHEL	Mar-13	21.73	41.36	20.62	10.9	128662	52078.11	44456.52	15029.55
BHEL	Mar-14	10.47	24.37	8.83	6.42	151217	37836.27	28855.96	12350.41
BHEL	Mar-15	4.16	17.25	-0.91	3.85	234218	31791.31	23072.11	16280.54
CIPLA	Mar-00	25.09	32.84	29.51	17.48	52762	1606.279	606.1171	4.414881

CIPLA	Mar-01	23.61	31.62	39.23	15.93	52254	1889.539	466.2432	-353.19
CIPLA	Mar-02	23.38	27.45	41.19	14.74	32251	2043.162	655.3184	116.6369
CIPLA	Mar-03	23.57	27.11	52.73	14.24	57626	2454.197	671.4059	-438.498
CIPLA	Mar-04	26.54	30.7	13.61	17.14	60971	3580.692	1064.533	144.379
CIPLA	Mar-05	30.78	30.44	17.44	18.77	178760	5822.149	1869.235	532.6454
CIPLA	Mar-06	20.7	24.77	8.49	15.97	150935	5857.242	1480.104	165.2046
CIPLA	Mar-07	18.72	20.24	8.99	13.41	133341	5986.399	1397.515	172.4749
CIPLA	Mar-08	17.89	23.05	10.01	14.2	127392	8413.566	1231.333	18.50485
CIPLA	Mar-09	18.31	25.12	12.13	14.5	211614	10216.18	3506.747	1051.23
CIPLA	Mar-10	14.54	17.31	11.89	10.93	191738	7282.755	1970.105	352.0331
CIPLA	Mar-11	14.9	20.43	14.44	12.93	169117	8865.35	2620.02	-355.328
CIPLA	Mar-12	17.01	21.3	18.92	13.87	216304	12034.52	4926.304	-191.486
CIPLA	Mar-13	13.77	17.94	17.04	10.79	207254	10408.48	4503.075	-84.263
CIPLA	Mar-14	10.66	13.48	14.64	7.93	460254	10599.41	3642.124	-846.761
RLL	Mar-00	15.82	17.82	22.84	12.9	38874	668.1572	63.31365	-1132.6
RLL	Mar-01	31.49	23.47	46.03	15.23	34812	1085.555	301.6583	-1085.27
RLL	Mar-02	31.77	37.91	68.92	27.98	69537	4213.523	-281.46	-635.824
RLL	Mar-03	21.7	25.32	51.09	18.19	52073	3220.922	413.28	63.93212
RLL	Mar-04	13.83	16.98	37.38	12.35	54055	2543.956	173.5313	24.89785
RLL	Mar-05	3.16	6.93	7.69	5.46	35814	1358.658	-144.903	-11.6948
RLL	Mar-06	9.33	10.63	21.38	7.79	86308	2438.935	1138.692	30.73877
RLL	Mar-07	26.91	32	69.82	22.59	78423	8780.851	1935.265	432.3923
RLL	Mar-08	9.88	12.44	27.95	8.94	51265	3487.361	1164.88	321.0956
RLL	Mar-09	10.67	15.53	33	9.33	29731	3507.512	1736.44	412.5025
RLL	Mar-10	14.31	19.37	49.32	10.61	156436	7265.882	2545.164	730.6699
RLL	Mar-11	14.84	15.95	50.26	9.22	217127	7539.627	2011.974	1788.972
RLL	Mar-12	13.58	19.5	53.49	9.95	231019	8991.369	3522.739	-626.856
RLL	Mar-13	16.26	20.22	74.57	11.09	222148	11221.2	4873.182	392.1249
RLL	Mar-14	20.72	22.79	111.21	13.05	342325	16562.15	5630.898	20.00932
RLL	Mar-15	15.8	15.66	99.27	8.83	487856	13183.68	3697.8	576.6338
GAIL	Mar-00	18.23	16.93	10.14	9.86	827	-342.877	1727.827	1583.001
GAIL	Mar-01	20.55	21.46	13.64	10.75	-14629	-5392.95	3979.442	2362.794
GAIL	Mar-02	22.23	26.51	13.92	11.56	11086	3495.225	6238.625	2101.944
GAIL	Mar-03	25.86	34.05	19.3	12.81	34	1067.096	8878.563	2894.769
GAIL	Mar-04	25.11	30.86	22.09	12.05	105757	11605.02	9469.759	1461.009
GAIL	Mar-05	22.65	28.7	23.14	10.71	92932	10326.92	9151.283	1471.382
GAIL	Mar-06	23.16	29.37	28.25	11.38	169396	15147.98	8864.902	457.8995
GAIL	Mar-07	20.95	28.16	23.85	14.39	109788	15869.71	11824.13	4271.501
GAIL	Mar-08	20	30.18	30.62	13.33	229226	19013.51	12646.97	465.2508
GAIL	Mar-09	18.98	29.18	22.7	12.21	162129	16839.46	13024.3	-234.795
GAIL	Mar-10	18.69	27.3	24.94	11.55	351832	23952.26	13940.21	-279.583
GAIL	Mar-11	18.5	25.47	28.13	12.18	397309	26818.83	16674.98	-204.763
GAIL	Mar-12	16.9	23.17	28.13	10.85	259357	25099.11	16495.91	755.2677
GAIL	Mar-13	16.6	20.1	32.09	9.76	162557	19272.27	20181.68	2833.007
GAIL	Mar-14	16.16	20.06	32.58	9.45	205907	19059.7	23153.62	-715.404
GAIL	Mar-15	10.44	12.72	23.21	6.69	202052	11510.94	13632.36	-5478.51
HMC	Mar-00	43.3	58.51	48.19	22.73	34304	1698.236	921.74	-76.1719

HMC	Mar-01	40.54	58.32	12.36	22.6	21936	2014.641	1300.237	123.8536
HMC	Mar-02	68.53	89	23.22	27.61	59880	4351.661	2306.659	512.2782
HMC	Mar-03	67.5	90.51	29.27	27.25	29018	4613.045	3003.81	684.4041
HMC	Mar-04	63.95	82.75	36.51	28.2	86549	6646.596	3432.215	816.1332
HMC	Mar-05	54.27	72.48	40.67	25.16	94525	7168.781	4052.418	816.9027
HMC	Mar-06	48.34	64.79	48.68	25.86	157289	8905.271	4402.816	589.7302
HMC	Mar-07	34.73	48.22	43.64	20.9	112115	7285.388	3746.612	331.8166
HMC	Mar-08	32.41	46.15	48.68	19.55	107962	7809.507	4383.173	291.8568
HMC	Mar-09	33.72	47.75	64.27	22.29	175688	11275.79	4980.031	138.9463
HMC	Mar-10	64.41	80.72	112.06	26.43	353253	20531.18	5933.979	142.4601
HMC	Mar-11	65.22	47.55	101.14	18.14	287254	17303.07	3855.49	5764.796
HMC	Mar-12	55.44	48.04	119.65	23.39	367430	20482.5	4749.147	5455.993
HMC	Mar-13	42.31	42.92	106.37	19	257836	16856.42	4057.644	2820.776
HMC	Mar-14	37.66	48.97	106.29	20.26	397861	17816.99	7444.262	458.3444
HMC	Mar-15	36.47	53.45	120.58	24.22	462281	22540.85	9214.56	-217.24
HUL	Mar-00	51.07	62.75	49.12	21.32	159354	10397.7	9978.873	5682.871
HUL	Mar-01	53.36	65.85	5.89	23.4	174990	12691.69	11116.11	7030.23
HUL	Mar-02	53.9	66.05	6.95	24.56	140538	15619.57	15115.98	10870.95
HUL	Mar-03	49.91	62.29	7.7	24.58	119227	16916.9	16455.04	11443.83
HUL	Mar-04	82.87	61.34	7.76	24.23	236552	17008.89	12815.89	3600.985
HUL	Mar-05	57.23	48.7	4.53	19.11	312627	12447.38	4645.506	-5490.74
HUL	Mar-06	61.09	74.25	5.81	22.84	709023	14546.84	-4548.6	-7411.58
HUL	Mar-07	68.14	79.83	6.96	26.09	538610	18654.94	3571.69	-1608.67
HUL	Mar-08	133.85	154.56	7.93	29.46	763267	19487.97	-5519.8	-22166.3
HUL	Mar-09	121.14	127.7	8.63	30.71	676901	25004.06	5421.833	-7771.76
HUL	Mar-10	85.26	113.38	9.19	23.83	978925	21856.84	-10170.2	-16653.8
HUL	Mar-11	86.73	111.38	9.84	22.76	1377498	22751.49	-19194.2	-25474
HUL	Mar-12	76.63	100.52	11.93	24.41	1738487	26313.7	-16866.7	-24719.5
HUL	Mar-13	142.02	188.34	14.66	32.72	2415723	37688.06	-27069.7	-38840.1
HUL	Mar-14	118.04	161.08	16.07	29.85	2774312	38740.68	-22881.1	-36060.9
HUL	Mar-15	115.87	166.49	17.79	30.95	2571410	42387.98	8364.273	-10009.2
INFOSYS	Mar-00	28.97	43.52	29.94	18.09	153027	6845.454	5493.248	-4069.06
INFOSYS	Mar-01	28.99	40.49	38.13	17.65	165155	8022.302	7062.182	-2509.16
INFOSYS	Mar-02	27.34	40.53	46.98	18.17	127453	10065.42	6390.657	-233.336
INFOSYS	Mar-03	25.86	39.92	53.84	15.57	102769	8815.555	7414.323	86.36645
INFOSYS	Mar-04	25.09	38.69	58.77	15.22	194441	12418.41	9910.375	461.5998
INFOSYS	Mar-05	27.97	39.18	70.33	19.26	255190	17939.5	13559.52	2348.677
INFOSYS	Mar-06	24.83	36.39	5.95	16.67	642049	19389.24	10289.5	-523.18
INFOSYS	Mar-07	26.01	37.99	7.01	18.28	462038	22927.93	13250.99	543.1606
INFOSYS	Mar-08	26	38.18	7.97	18.62	657637	27894.81	15985.5	567.1327
INFOSYS	Mar-09	23.89	35.49	8.5	18.5	560709	30095.86	16257.52	-276.947
INFOSYS	Mar-10	28.99	43.56	10.59	17.3	864653	34267.66	19837.57	-3431.55
INFOSYS	Mar-11	31.37	46.11	6.46	19.55	1245087	44346.17	22738.11	-4736.1
INFOSYS	Mar-12	32.89	48.15	7.89	21.52	1586221	56200.55	27288.17	-5762.01
INFOSYS	Mar-13	33.37	48.51	9.4	22.58	2220106	70618.06	32694.64	-6561.4
INFOSYS	Mar-14	33.63	49.13	10.95	22.49	2544980	81153.05	40668.57	973.5919
INFOSYS	Mar-15	31.41	46.03	12.01	22.53	2301818	89089.24	44087.22	-2376.33

ITC	Mar-00	35.22	40.32	43.26	29.36	580537	2920.989	467.8724	73.27241
ITC	Mar-01	45.25	53.18	94.43	38.42	256221	6315.491	754.2708	41.17077
ITC	Mar-02	38.84	46.41	120.9	32.05	226369	7527.579	1512.409	80.50906
ITC	Mar-03	33.49	41.88	141.99	27.41	239035	8802.198	2292.751	171.8515
ITC	Mar-04	38.22	46.17	186.51	25.37	296549	11481.65	2281.974	7.074245
ITC	Mar-05	36.32	43.51	70.33	29.46	557054	17829.46	3281.786	11.78614
ITC	Mar-06	35.1	41.15	86.91	27.19	752418	22801.85	3492.826	262.8262
ITC	Mar-07	33.88	38.5	64.04	29.16	1037953	34373.94	6014.347	1244.347
ITC	Mar-08	33.14	40.34	73.08	26.03	683140	38035.95	12099.3	2899.298
ITC	Mar-09	32.67	40.88	99.7	28.74	580394	47669.92	11105.22	1075.221
ITC	Mar-10	26.33	35.6	95.57	21.18	1280250	47370.83	23513.13	3183.134
ITC	Mar-11	26.3	36.04	112.22	21.66	1613375	54575.51	23772.24	-7.76214
ITC	Mar-12	28.46	39.46	147.5	23.71	1347570	70440.7	32026.29	-13.7096
ITC	Mar-13	25.28	34.35	158.85	20.8	1298895	70410.66	32279.37	-70.6267
ITC	Mar-14	24.22	33.63	177.19	18.86	1461914	77599.45	38435.18	165.1757
ITC	Mar-15	25.31	35.62	100.93	19.82	2065024	101895.9	53665.42	5715.42
L&T	Mar-00	9.02	10.67	11.13	7.28	33585	1603.362	1054.822	-1921.71
L&T	Mar-01	8.04	10.68	10.53	7.45	15826	1430.405	768.6033	-1362.16
L&T	Mar-02	10.69	12.97	12.04	7.57	12505	2646.006	1010.489	-233.54
L&T	Mar-03	12.52	13.77	16.01	6.51	11334	2444.503	1237.084	766.5489
L&T	Mar-04	19.76	26.84	19.15	7.72	115938	5635.711	3369.567	206.9237
L&T	Mar-05	29.83	31.56	66.72	10.87	96311	8975.494	4201.379	1719.093
L&T	Mar-06	22.04	29.66	66.42	9.84	288316	10795.2	4704.804	-3196.48
L&T	Mar-07	24.47	30.27	45.71	9.32	401351	13694.04	7091.88	-2022.78
L&T	Mar-08	22.81	27.24	69.74	9.26	788971	21596.24	11415.6	-4004.05
L&T	Mar-09	28	30.7	42.09	11.61	269615	30579.79	21934.3	7521.161
L&T	Mar-10	23.92	27.13	72.58	10.47	796497	37334.64	15224.77	-8201.38
L&T	Mar-11	18.14	25.16	61.18	8.69	788477	36989.73	20881.78	-11536
L&T	Mar-12	17.69	22.47	72.34	7.96	548483	34902.72	18783.75	-3937.82
L&T	Mar-13	16.89	21.34	65.41	8.41	549265	40762.09	24269.4	-753.086
L&T	Mar-14	16.36	19.69	56.58	8.41	843936	41413.23	20227.55	-14942.2
L&T	Mar-15	13.67	17.25	54.05	7.28	1227998	39471.49	16779.03	-31784.4
LUPIN	Mar-00	14.63	14.73	-0.03	11.15	-649	101.4366	110.4	94.9
LUPIN	Mar-01	14.9	12.96	215.93	10.12	-3488	-58161.1	569.7	519.7
LUPIN	Mar-02	21.71	16.73	18.95	12.05	1372	327.3079	203.8469	152.2091
LUPIN	Mar-03	19.11	15.32	19.44	9.83	1206	102.382	153.4938	127.3794
LUPIN	Mar-04	21.22	24.28	37.36	11.56	21611	714.2376	-48.4253	-1144
LUPIN	Mar-05	16.44	12.18	21.42	8.54	17195	635.4304	-27.8005	-328.664
LUPIN	Mar-06	27.8	17.39	45.03	11.51	34448	1608.081	457.2067	-31.769
LUPIN	Mar-07	33.54	25.15	22.63	15.59	39777	2870.808	2108.289	1057.453
LUPIN	Mar-08	33.66	27.88	40.38	18.32	27369	3984.214	2261.621	1876.404
LUPIN	Mar-09	30.32	22.28	50.54	13.62	43326	3199.826	529.1057	678.0458
LUPIN	Mar-10	25.64	22.13	73.69	13.84	119188	4933.074	530.6245	492.6067
LUPIN	Mar-11	25.69	21.12	18.26	12.64	153803	5318.742	300.5413	603.6028
LUPIN	Mar-12	21.54	21.57	18.3	13.41	199220	6737.51	1872.816	248.8617
LUPIN	Mar-13	26.01	31.94	28.45	18.77	233051	10893.25	4475.271	128.6228
LUPIN	Mar-14	33.74	45.2	51.87	26.93	349845	20011	8449.641	317.6568

LUPIN	Mar-15	26.56	35.57	52.9	21.4	811868	21341.49	8384.583	81.35922
MML	Mar-00	14.29	15.74	24.49	8.54	16526	773.3698	845.7817	-536.206
MML	Mar-01	6.59	8.93	9.16	5.99	-5010	-259.136	273.0371	-22.0101
MML	Mar-02	6.51	8.42	6.52	5.66	-1700	2.177384	249.4475	-99.8559
MML	Mar-03	9.61	14.78	12.41	9.05	-3603	714.4383	529.2438	166.6302
MML	Mar-04	19.45	21.13	27.91	11.17	36387	2813.477	1063.011	-190.332
MML	Mar-05	26.32	25.47	42.5	10.71	38195	3319.758	2212.326	1240.75
MML	Mar-06	29.79	30	32.83	14.01	122294	6601.01	3085.616	1529.421
MML	Mar-07	30.33	28.07	43.22	13.36	156201	8538.161	3579.56	2488.856
MML	Mar-08	25.52	21.62	33.23	11.49	127710	8840.548	5899.984	3267.747
MML	Mar-09	16.05	12.98	28.08	7.92	54470	5714.838	2577.978	1893.613
MML	Mar-10	26.71	28.56	36.45	13.91	237211	15755.75	7387.12	981.3889
MML	Mar-11	25.84	28.28	42.62	14.21	325876	20952.16	9027.792	2296.064
MML	Mar-12	23.8	24.04	44.43	12.61	306941	20718.69	8788.086	2547.833
MML	Mar-13	22.89	25.57	54.22	13.2	382249	26007.13	11175.59	2498.008
MML	Mar-14	22.4	22.28	60.98	11.85	436171	24892.17	6133.674	1042.275
MML	Mar-15	17.27	19.09	48.53	10.53	544887	25413.05	11572.59	2243.122
ONGC	Mar-00	13.57	25.63	24.39	11.93	-73940	-362.028	24809.5	5892.936
ONGC	Mar-01	17.34	35.29	36.38	14.27	-112470	-15698.1	39541.15	5588.616
ONGC	Mar-02	21	32	42.96	12.57	94661	24217.24	37266.18	5070.079
ONGC	Mar-03	29.57	52.67	79.03	17.81	151265	43711.26	51399.35	-5252.51
ONGC	Mar-04	21.66	31.96	59.42	13.91	798402	82703.11	51477.67	18702.28
ONGC	Mar-05	28.03	48.07	89.95	15.7	795601	101953.7	68369.44	6103.767
ONGC	Mar-06	26.93	47.07	97.35	15.61	1331327	139092.6	78615.42	5573.432
ONGC	Mar-07	25.47	45.9	70.54	13.87	1264152	140652.4	85838.67	5462.522
ONGC	Mar-08	23.88	43.84	74.5	16.48	1399548	157666.5	96841.05	7406.481
ONGC	Mar-09	20.65	41.99	70.97	14.53	886831	150274.9	93602.48	7437.776
ONGC	Mar-10	19.4	39.65	77.23	14.52	1485139	184318.3	84809.25	2333.401
ONGC	Mar-11	19.57	36.51	21.61	13.58	1514863	178913.9	95817.86	4296.06
ONGC	Mar-12	22.47	39.62	24.65	15.42	1169041	222201.3	161686.9	47054.52
ONGC	Mar-13	17.02	35.33	22.56	14.11	1435789	225396	119448.5	16247.37
ONGC	Mar-14	16.29	29.78	23.56	13.57	1370323	221521	120648.4	19422.99
ONGC	Mar-15	12.35	26.16	19.32	11.14	1188596	174272.9	106109.4	13525.2
RIL	Mar-00	22.01	15.27	22.87	11.53	222219	15702.03	540.2033	-2527.89
RIL	Mar-01	22.06	18.08	25.1	12.72	291968	18984.42	1395.605	-9068.92
RIL	Mar-02	12.93	14.63	30.47	10.84	66126	12456.55	12243.18	-2986.71
RIL	Mar-03	14.88	12.57	29.52	8.9	110114	11254.39	8603.747	4085.046
RIL	Mar-04	16.2	14.89	36.59	10.26	434132	37702.98	11775.58	-457.123
RIL	Mar-05	20.1	18.81	54.42	12.1	384051	46488.72	14915.78	6396.684
RIL	Mar-06	20.09	15.32	65.09	10.09	658040	47666.67	16394.45	13928.51
RIL	Mar-07	19.48	15.76	85.75	10.61	1293655	67093.19	25818.49	-4048.78
RIL	Mar-08	24.21	19.12	133.87	13.22	2486014	128629.5	36112.33	-1433.6
RIL	Mar-09	13.36	15.73	99.42	11.26	1251327	133364.5	27990.79	-29630.2
RIL	Mar-10	12.65	10.31	49.65	6.65	2230844	80472.44	43273.48	2888.488
RIL	Mar-11	13.89	11.71	62.15	7.28	1969021	93560.67	48989.32	20059.04
RIL	Mar-12	12.3	11.34	61.41	7.11	817477	51804.82	56583.2	33214.05
RIL	Mar-13	11.74	10.84	65.2	6.85	708367	41130.82	52392.08	34160.22

RIL	Mar-14	11.15	10.45	68.2	6.45	1033143	64071.83	57779.94	38576.18
RIL	Mar-15	10.36	10.07	70.32	6.27	506713	37970.7	64008.74	44128.81
SPL	Mar-00	26.5	24.77	17.71	19.72	26455	685.562	83.87967	-1048.75
SPL	Mar-01	31.25	30.39	28.64	24.26	20978	1070.203	106.7219	-431.725
SPL	Mar-02	31.48	34.65	36.72	26.49	25963	1421.545	129.303	-97.6582
SPL	Mar-03	34	36.02	24.45	27.33	18412	1745.202	248.3036	36.61396
SPL	Mar-04	28.5	23.84	27.73	18.84	51841	2273.477	179.6481	173.3453
SPL	Mar-05	27.76	11.65	16.17	10.31	76410	2757.399	243.3271	1343.356
SPL	Mar-06	31.52	15.67	24.78	13.73	146282	4427.299	283.8855	1963.188
SPL	Mar-07	25.69	18.55	31.84	15.57	178454	5659.423	276.2904	1634.996
SPL	Mar-08	24.1	24.59	48.94	18.75	212967	8585.03	385.151	192.4928
SPL	Mar-09	24.56	25.22	60.91	20.35	178872	9977.134	337.1274	47.34213
SPL	Mar-10	15.72	17.33	43.36	14.24	313476	8018.855	510.3669	19.77904
SPL	Mar-11	20.71	21.63	13.34	18.36	390717	11965.59	725.787	77.20189
SPL	Mar-12	21.57	22.6	19.25	19.01	510985	14987.24	-2662.83	-2873.87
SPL	Mar-13	6.63	9.26	4.99	6.29	769581	5513.639	1467.417	-18.1538
SPL	Mar-14	-38.18	-26	0.23	-17.42	1113424	-25916.7	-28490.8	-33018.5
SPL	Mar-15	-6.47	-2.63	-7.13	-1.99	1889385	-10598.5	-823.015	-34943.8
TML	Mar-00	2.4	11.03	-2.66	6.94	4974	1802.492	1444.911	-1863.68
TML	Mar-01	-21.18	2.22	-18.58	1.34	-6976	2955.347	-235.626	-4455.69
TML	Mar-02	-2.18	11.44	-5.57	6.68	7651	3108.578	900.3013	-2129.16
TML	Mar-03	11.69	24.07	8.59	10.89	24116	5994.026	2359.29	-904.679
TML	Mar-04	22.69	33.17	23.29	14.41	135718	12240.89	4706.753	-1103.91
TML	Mar-05	30.22	29.66	34.24	10.96	108815	10797.66	4138.467	2269.859
TML	Mar-06	27.82	29.6	39.61	12.66	302066	16791.87	5377.543	-609.936
TML	Mar-07	28	29.44	48	13.27	212119	19036.53	7232.074	1076.947
TML	Mar-08	25.99	24.33	51.31	12.4	162263	22441.25	5983.429	3251.267
TML	Mar-09	8.22	10.46	20.83	6.98	-42567	2189.886	925.0462	2375.566
TML	Mar-10	14.99	17.1	44.1	8.61	233264	24371.64	5969.131	-1628.44
TML	Mar-11	9.06	10.92	33.66	5.72	471604	15639.16	3846.078	-11465.6
TML	Mar-12	6.43	9.3	4.62	4.68	548639	12044.82	1003.308	-16601.5
TML	Mar-13	1.59	5.85	0.81	2.53	538191	-1049.4	-431.482	-26607.3
TML	Mar-14	2.16	3.98	0.59	2.53	898632	451.9213	-9376.89	-37874.1
TML	Mar-15	-31.31	-4.17	-17.45	-2.79	1356673	-29359.5	8936.019	-105222
TSL	Mar-00	11.8	10.31	7.68	6.49	6822	107.447	1944.324	383.1457
TSL	Mar-01	14.46	11.97	17.09	7.51	6715	-668.132	-254.082	238.9905
TSL	Mar-02	5.95	8.75	4.34	5.17	1448	952.9422	919.1605	-479.646
TSL	Mar-03	31.78	23.67	24.95	10.42	17335	4650.243	3570.756	3957.236
TSL	Mar-04	40.05	39.12	43.04	14.18	97906	12765.17	10787.66	4531.423
TSL	Mar-05	50.75	57.78	60.77	21.75	153436	24247.85	19633.92	6596.753
TSL	Mar-06	36.9	45.17	62.5	19.66	201863	25148.77	17805.87	3492.182
TSL	Mar-07	30.39	27.75	71.56	13.59	122044	17567.05	21068.78	13276.06
TSL	Mar-08	21.63	18.06	63.77	10.07	289674	19669.34	24085.75	6603.847
TSL	Mar-09	21.15	15.53	71.29	9.01	-95483	-44734.5	21089.27	23774.2
TSL	Mar-10	13.65	14.62	56.62	8.83	191678	13566.16	21902.68	3366.528
TSL	Mar-11	14.16	15.01	71.79	8.99	110746	6222.855	28847.87	10223.84
TSL	Mar-12	12.33	15.28	69.51	8.68	-86173	-17349.7	31107.59	9378.269

TSL	Mar-13	8.84	13.07	52.2	8.29	-269573	-31051.4	27665.18	8845.393
TSL	Mar-14	10.15	13.41	66.36	7.39	-249271	-44597.9	32758.84	10446.02
TSL	Mar-15	9.37	11.8	53.63	7.56	-379680	-53885.6	33039.59	19107.52
WIPRO	Mar-00	37.94	58.42	14.4	29.18	1252384	3658.123	-436.927	-24898.9
WIPRO	Mar-01	35.04	41.54	27.44	28.27	291362	6833.061	1265.678	-625.285
WIPRO	Mar-02	34.2	39.79	35.61	29.8	370236	9011.925	1466.279	135.4416
WIPRO	Mar-03	24.42	28.59	35.21	21.83	252367	8017.337	1292.32	-245.487
WIPRO	Mar-04	26.08	29.73	39.94	17.33	281325	8212.315	1278.819	-250.96
WIPRO	Mar-05	30.55	35.66	21.2	22.4	423230	13512.63	2582.649	-182.643
WIPRO	Mar-06	31.43	37.21	13.94	21.53	732075	19052.73	3873.362	149.1897
WIPRO	Mar-07	30.49	33.79	19.48	21.54	720293	25699.84	3377.582	-269.445
WIPRO	Mar-08	26.38	24.35	20.6	16.25	505449	25123.63	5126.431	-863.435
WIPRO	Mar-09	23.76	27.83	20.05	16.33	234357	28126.95	6476.572	3451.477
WIPRO	Mar-10	27.68	25.33	33.04	16.51	860810	41035.51	8849.195	6903.035
WIPRO	Mar-11	22.72	22.64	19.49	14.47	960742	40466.97	9807.026	6293.439
WIPRO	Mar-12	19.24	22.86	18.74	13.24	835869	40306.73	13862.11	5765.006
WIPRO	Mar-13	23.32	25.21	22.59	14.24	834377	45107.29	17277.04	8646.134
WIPRO	Mar-14	25.16	29.74	29.5	16.7	1044665	60547.97	24433.9	7949.7
WIPRO	Mar-15	23.66	27.05	32.8	15.64	1203849	65825.53	25536.36	10409.99

List of Companies Selected for Study arranged Sector Wise

AUTOMOTIVE SECTOR
Tata Motors Limited(TML)
Mahindra & Mahindra Limited(MML)
Hero Motocorp Ltd(HML)

PETROCHEMICAL SECTOR
Oil and Natural Gas Corporation Limited(ONGC)
GAIL (India) Limited(GAIL)
Reliance Industries Limited(RIL)

METAL SECTOR
Tata Steel Limited(TSL)

HEAVY ENGINEERING AND MANUFACTURING SECTOR
Bharat Heavy Electricals Limited(BHEL)
Larsen & Toubro Limited(L&T)

IT AND TELECOMMUNICATION SECTOR
Infosys Limited(INFOSYS)
Wipro Limited(WIPRO)

PHARMACEUTICAL SECTOR
Cipla Limited(CIPLA)
Sun Pharmaceutical Industries Limited(SPL)
Lupin Limited(LUPIN)
Dr. Reddy'S Laboratories Ltd(REDDY)

FMCG SECTOR
Hindustan Unilever Limited(HUL)
ITC Limited(ITC)
PAINTS SECTOR
Asian Paints Limited(APL)

A STUDY ON BEHAVIORAL BIASES AMONG SELECTIVE INDIAN INVESTORS

Arindam Banerjee
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Abstract:

One of the major pillars of the traditional theory of finance is efficient market (EM) theory. However, the theory of EM does consider all human beings as rational creatures. According to EM, all investors have the capabilities to take their financial decisions rationally, and without having any biases. In a sense, this means if an investor follows a strategy, he would earn a return very similar to the market return. He should always behave in a manner that is suitable for being a rational person (Baker and Nofsinger, 2002)

In recent years, however this proposition is challenged by many quarters, particularly by the practitioners of behavioral finance. The subject of study for behavioral finance is about the actual behavior of investor at the time of taking financial decisions. One of the major themes related to behavioral finance is heuristic driven bias (Shefrin, 2000).

In this paper, we have examined the existence of select behavioral biases among Indian investors. The basic objective of this study is to understand the existence and extent of behavioral biases among Indian investors.

Key Words:

Efficient Market (EM) Theory, Behavioural Biases, Indian Investors

Introduction

One of the major assumptions in traditional financial theories is that investors are rational. A rational human may take the decisions that can maximize the value to him. In reality, however, the human mind gets influenced by sentiments and biases. One of the major pillars of the traditional theory of finance is efficient market (EM) theory. However, the theory of EM considers all human beings as rational creatures. According to EM, all investors have the capability to take their financial decisions rationally, and without having any biases. In a sense, this means if investors follow a strategy, they would earn a return very similar to the market return. He should always behave in a manner that is suitable for being a rational person (Baker and Nofsinger, 2002)

In recent years, however, this proposition is challenged by many quarters, particularly by the practitioners of behavioral finance. The subject of study for behavioral finance is about the actual behavior of investor at the time of taking financial decisions. One of the major themes related to behavioral finance is heuristic driven bias (Shefrin, 2000).

Motivation

Literature shows ample evidence about existence of behavioral biases among and its impact on investment decisions (Hershleifer, 2015; Thaler, 1999). However, very few studies are done, which explored the psyche of Indian investors. This motivated us to explore the psychology of Indian investors. In this paper, we tried to identify and explore the psychological biases, which are most relevant for the Indian investors. In this paper, initially we considered twenty behavioral biases (Exhibit 1), as described by Pompian (2010). We tasted the presence of these twenty biases among Indian investors by collecting the responses through a structured questioner. After studying the responses, we further clustered these twenty biases into eight groups of biases; those are most effective for Indian investors.

The objective of this paper is

I. *To assess the existence of behavioral biases among Indian investors, and*
II. *To identify the groups of biases those are most prevalent among Indian Investors.*

Data

Primary data has been collected through a survey-based structured questionnaire for the present research. The target respondents are consisting of the people from investing class, i.e. the people having financial savings and the capacity to invest in various financial segments (Sahi and Arora, 2012). As the change in investor behaviour can be best observed where the asset price changes fast enough with the participation of market players, we narrowed down to equity investors only for collecting the responses.

One of the issues was the availability of investors as respondents. As a confirmed list of investors is not available, the responses are collected on the basis of snowball sampling and judgment [Gupta (1991), Davar and Gill (2007) and Sahi and Arora (2012)].

The data is collected through a structured questioner containing 39 questions. The questions cover all the 20 biases as described by Pompian (2010). A pilot survey

is being conducted among selected group of investors. We used Google Forms for conducting an online pilot survey, and received 79 responses. After eliminating 13 incomplete responses, finally 66 responses are considered for the study. The responses received from the respondents are then segmented by using Cluster Analysis. The validity of the clusters analysis is then checked by using one-way Anova.

Respondent Profile

The profile of respondents is provided in Table 1. Around 18 percent of the respondents are female, and 82 percent are male. Most of the respondents fall under the age group of 25 years to 55 years. The income bracket for most of the respondents ranges between INR 500000 to INR 1500000. Most of the respondents invest between INR 100000 to INR 500000 per annum. Most of the respondents are professionals and also majority of the respondents are service-holders.

Table 1: Profile of Respondents

(i) Gender

	Frequency	*Percent*	*Valid Percent*	*Cumulative Percent*
Female	*12*	*18.2*	*18.2*	*18.2*
Male	*54*	*81.8*	*81.8*	*100.0*
Total	***66***	***100.0***	***100.0***	

(ii) Age

Age in years	*Frequency*	*Percent*	*Valid Percent*	*Cumulative Percent*
<25	*2*	*3.0*	*3.0*	*3.0*
25 -35	*22*	*33.3*	*33.3*	*36.4*
36-45	*19*	*28.8*	*28.8*	*65.2*
46-55	*11*	*16.7*	*16.7*	*81.8*
>55	*12*	*18.2*	*18.2*	*100.0*
Total	***66***	***100.0***	***100.0***	

(iii) Income

INR	*Frequency*	*Percent*	*Valid Percent*	*Cumulative Percent*
<500000	*13*	*19.7*	*19.7*	*19.7*
500000-1000000	*25*	*37.9*	*37.9*	*57.6*
1000000-1500000	*17*	*25.8*	*25.8*	*83.3*
1500000-2000000	*4*	*6.1*	*6.1*	*89.4*
2000000-2500000	*2*	*3.0*	*3.0*	*92.4*
>2500000	*5*	*7.6*	*7.6*	*100.0*
Total	***66***	***100.0***	***100.0***	

(iv) Investment

INR	Frequency	Percent	Valid Percent	Cumulative Percent
< 100000	29	43.9	43.9	43.9
100000-300000	21	31.8	31.8	75.8
300000-500000	12	18.2	18.2	93.9
500000-700000	1	1.5	1.5	95.5
>700000	3	4.5	4.5	100.0
Total	**66**	**100.0**	**100.0**	

(v) Education

	Frequency	Percent	Valid Percent	Cumulative Percent
Non-Professional	6	9.1	9.1	9.1
Professional	60	90.9	90.9	100.0
Total	**66**	**100.0**	**100.0**	

(vi) Occupation

	Frequency	Percent	Valid Percent	Cumulative Percent
Service	61	92.4	92.4	92.4
Business	1	1.5	1.5	93.9
Self Employed Professional	4	6.1	6.1	100.0
Total	**66**	**100.0**	**100.0**	

Survey Questionnaire

The survey questionnaire is being constructed to capture the behavioral profile of respondents. The basic questionnaire comprised of 39 questions. These 39 questions covered around 20 biases as mentioned by Pompian (2011).

The list of behavioral biases covered under the questionnaire is summarized in Exhibit 1.

Exhibit 1: Summary of Behavioural Biases

1. Overconfidence Bias:

Overconfidence is a kind of heuristic driven bias. People often become overconfident about their abilities. They become overconfident in the areas in which, they think they have greater knowledge. Overconfidence is defined as the investors' tendency to overestimate the precision of their own decision abilities (Daniel, Hirshleifer, and Subrahmanyam, 1998, 2004; Gervais and Odean, 2001). Overconfident people ignore public signals, and rely more on their own private signals. Overconfidence bias is backed by strong empirical evidences

(Odean, 1999; Barber and Odean, 2000; 2001; Staman, Thorley and Vorknik, 2006). According to Glaser and Weber (2007), overconfident people used to trade more. Chordia, Huh and Subrahmanyam, (2007), probed the effect of overconfidence bias on the relationship between past returns and current volume. Overconfidence makes the trader sure about the future positive outcome. However, increase in volume also leads to rising transaction costs.

2. Representativeness Bias:

Representativeness may be defined as the tendency to tag a future investment return with past experience on investment outcomes. This leads to labelling the current investment as good or as bad based on past performance (Baker and Ricciardi, 2014). This often leads to imprecise decision outcome.

3. Anchoring Bias:

At the time of estimating an unknown value, people tend to make it around a known value. Campbell and Sharpe (2009) investigate the presence of anchoring bias in analysts' forecasts of monthly releases for a period of 1991 to 2006. They find that forecasts of any given release were anchored towards the recent values of that release, thereby giving rise to predictable surprises.

4. Cognitive Dissonance Bias:

According to Pompian (2011), When newly acquired information conflicts with preexisting understanding, people often experience mental discomfort — a psychological phenomenon known as cognitive dissonance. *Cognitions*, in psychology, represent attitudes, emotions, beliefs, or values; and *cognitive dissonance* is a state of imbalance that occurs when contradictory cognitions intersect.

5. Availability Bias:

This is another type of heuristic bias. Availability bias implores people to make decisions on the basis of available information. People make decisions on the basis of information they can easily recall or available compared to distant information.

6. Self Attribution Bias:

According to Pompian (2011), *Self-attribution bias* (or self-serving attributional bias) refers to the tendency of individuals to ascribe their successes to innate aspects, such as talent or foresight, while more often blaming failures on outside influences, such as bad luck.

7. Illusion of Control Bias:

According to Pompian (2011), The *illusion of control* bias describes the tendency of human beings to believe that they can control or at least influence outcomes when, in fact, they cannot.

8. Conservatism Bias:

According to Pompian (2011), *Conservatism bias* is a mental process in which people cling to their prior views or forecasts at the expense of acknowledging new information.

9. Ambiguity-Aversion Bias:

According to Pompian (2011), people do not like to gamble when probability distributions seem uncertain. In general, people hesitate

in situations of ambiguity, a tendency referred to as *ambiguity aversion*.

10. Endowment Bias:

Endowment bias forces more value in situations of holding the property rights.

11. Self-Control Bias:

Self control bias is one where people focus on short-term goal while ignoring the long-term perspective. Pompian (2011) describes self control bias as the conflict between individuals' aspirations and their inability to achieve those aspirations due to their lack of self control. In financial terms, lack of self control leads the investors to spend more today and save less for future. They also take higher risk to earn greater short-term returns.

12. Optimism Bias:

Optimism may be defined as the tendency of individuals to overestimate the possibility of a favourable outcome. In financial terms, it is the inclination of investors to overestimate the mean return expectations of a risky investment (Heifetz and Spiegel, 2001; Germain et al., 2006; Barone Adesi et al., 2012).

Optimism (pessimism) is a very significant bias. It is responsible for setting the mood of the financial markets. This bias is driven by past returns that have an impact on return expectations, return tolerance and risk perception of investors.

13. Mental Accounting:

Thaler (1999) introduced the concept of mental accounting. Individuals have a tendency to segregate their information into manageable mental accounts. Mental accounting is a set of cognitive operations used by individuals to organize, evaluate, and keep track of financial activities. To put it more simply, people tend to keep aside a certain portion of their wealth that is meant for their more "important" needs.

14. Confirmation Bias:

Confirmation bias refers to a type of discerning perception that emphasizes ideas that confirm our beliefs, while devaluing whatever contradicts our beliefs.

15. Hindsight Bias:

Hindsight bias gives a perception that events were predictable, after the happenings are over.

16. Loss Aversion Bias:

Under loss aversion bias, individuals try to avoid losses more strongly compared to gains (Kahneman and Tversky, 1979). Loss probably brings greater regret than that of a gain. Joshua D. Coval and Tyler Shumway (2005) analyze the effect of loss aversion bias in terms of risk taking in market makers. They show that in intra-day trading, a loss in the morning leads to higher risk taking behavior in the afternoon. In this case, the investors start taking higher risk in order to have a chance of nullifying their earlier losses. Doviak (2016) explained that when an investment is behaving as expected, an individual's satisfaction can be measured by a slow, gentle, upward curve. However, when an investment is not performing well, an individual's dissatisfaction can be measured by a sharp, quickly descending cliff.

17. Recency Bias:

Recency bias is a cognitive predisposition that causes people to more notably recall and give emphasis to recent events and interpretation than those that occurred in the near or distant past.

18. Regret Aversion Bias:

According to Pompian (2011), people exhibiting *regret aversion* avoid taking significant actions because they fear that, in hindsight, whatever course they select will prove less than optimal.

19. Framing Bias:

Framing implies that the presentation of a concept to individual may influence her decisions. For example, restaurants may offer 'happy hour' discounts, but they never charge 'peak hour' premiums. This gives the customers a feeling of getting a meal cheap

20. Disposition Effect:

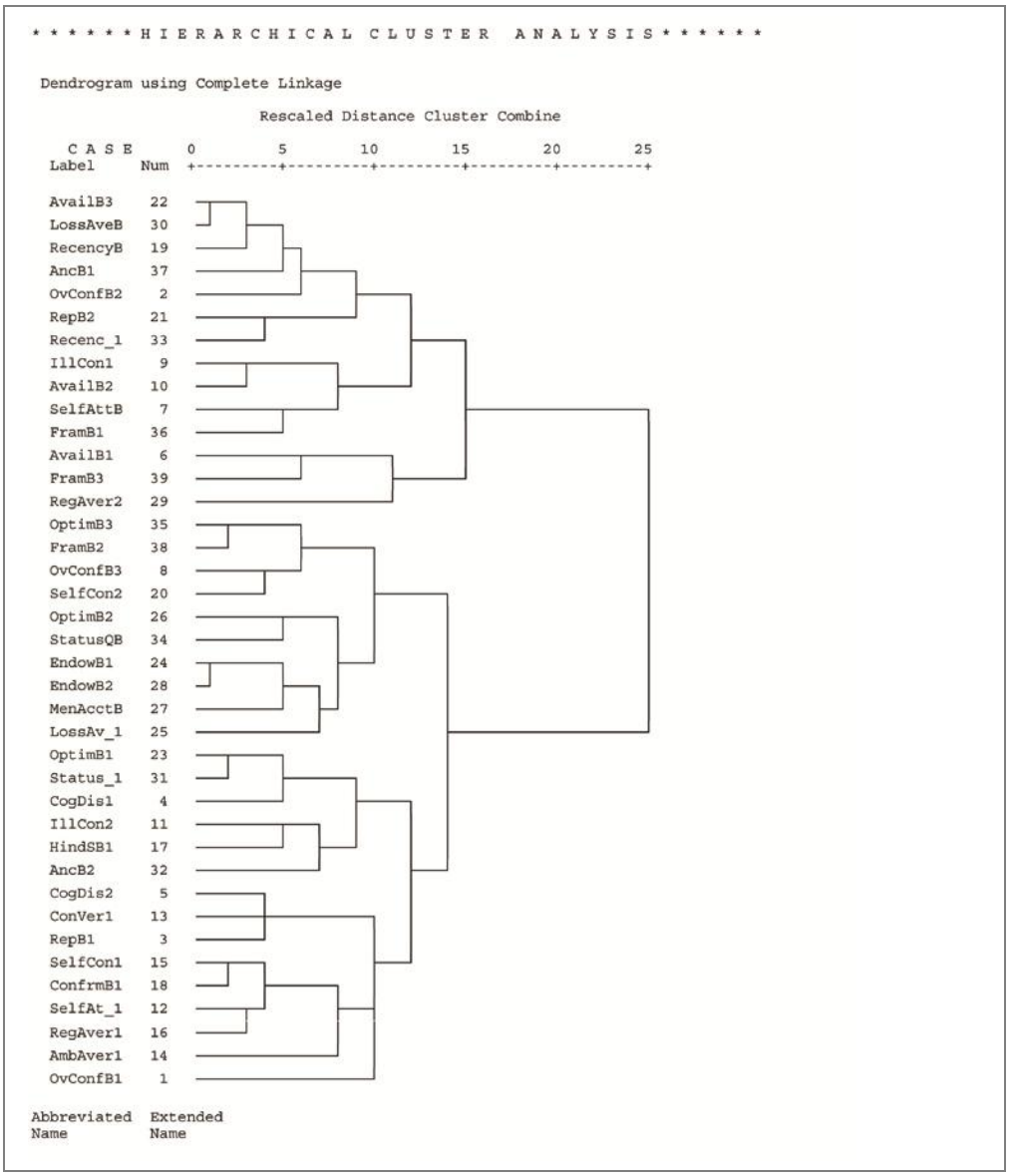
Shefrin and Statman (1985), Odean (1998) and Weber and Camerer (1998), document that investors are unwilling to realize their losses, while they realize their gains too early. This penchant is known as the disposition effect. For instance, consider you have a stock which is incurring losses from past three months. General tendency is to hold on to such stocks till they atleast reach breakeven. This is because selling at a loss hurts. Consider another situation, where the same stock starts to recover after a long period of losses. In this case, if you are amongst the people who would sell such a stock as soon as you realize some minimal gain, then you are most probably affected by the disposition effect.

The questions are framed in such a manner that they capture each of the biases prevalent in respondents' mind. As part of pilot study we collected response from 66 respondents.

Research Methodology

To get an understanding of the most dominant biases, we first conducted a cluster analysis of the responses received from the respondents. On the basis of cluster analysis, a dendogram is being created (Exhibit 2).

Exhibit 2: Dendogram of hierarchical cluster analysis using complete linkages



The responses are then clustered into similar categories using a dendogram. On the basis of the cluster analysis, the twenty biases are finally clustered into eight groups (Exhibit 3).

Exhibit 3: Biases Presented in 8 Clusters

Sl No.	CLUSTER
1	Sense of being in command and self-control
2	Conservatism resulting into status quo
3	Cognitive Dissonance
4	Overconfidence and Optimism
5	Being in sense of Inertia
6	Sense of control arising from accessibility
7	Mental Accounting
8	Recent Memories Bias
9	Disposition Effect/ Loss Aversion Bias

Reliability Test

The reliability of the date is being tasted by using Cronbach's Alpha.

The Cronbach's Alpha for the dataset is 0.691. We accept this for the time being as this is only a pilot study, and the dataset is small.

Table 2: Reliability Statistics

Cronbach's Alpha	N of Items
.691	32

One Way ANOVA

The validity of these clusters is validated through one way ANOVA. The result of ANOVA is given below:

Table 3: ANOVA

Average Score

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4.182	9	.465	12.384	.000
Within Groups	.826	22	.038		
Total	**5.008**	**31**			

A one-way between subjects ANOVA was conducted to compare the effect of psychological biases on investment decisions. From table 3, there was significant differences between the

clusters of psychological biases [F(4.182,0.826) =12.384, p = .000]. This result indicates that there are significant nine clusters of psychological biases prevailing among Indian investors. The result shows that the clusters are valid and investors' biases can be clustered into nine groups.

Conclusion and scope for future research

The objective of this paper is to assess the existence of biases prevalent among Indian investors. Starting with the twenty biases that are well documented in literature, we collected responses from the investors through a structured questionnaire. However, many of these biases are very close to one another, and the respondents also responded in a similar way. So, we clustered the responses for original twenty biases into nine groups. The validity of these nine psychological bias groups is then tasted by using one-way anova.

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2016: A QUANTUM LEAP FOR INDIAN CORPORATE BOND MARKETS

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Abstract:

India's focus on developing an efficient corporate bond market has been continuous and consistent ever since the Asian Crisis of 1997-99. R.H. Patil's High Level Committee report in 2005 set the ball rolling and more recently, H.R Khan's 7i Framework for development of the corporate bond markets in India brought out the important areas that required attention from policymakers and regulators to give the market the push it needs. After showing small but steady growth over the last decade, 2016 was a momentous year for the corporate bond markets in India. With a slew of regulatory changes, focus on improving the infrastructure, the faltering state of the Indian Banking system and declining interest rates have ensured that the corporate bond markets in India. With a slew of regulatory changes, focus on improving the infrastructure, the faltering state of the Indian Banking system and declining interest rates have ensured that the corporate bond markets have reached a much required turning point. This paper explores the leaps made by the market in calendar year 2016 as an event study based on news analytics pertaining to the corporate bond market in India. The researchers have used the 7i Framework as a base for classifying the information and to arrive at those areas that may still require some attention from policymakers in the time to come.

Key Words:

Corporate Bond Markets, Indian Corporate Bond Markets, 7i Framework

Section 1: Background and Context

India has traditionally been a bank-based economy. This is evident from the fact that the corporate bond market contributes only 31% of the total credit to the Indian corporate sector. While this is an improvement from about 21% in 2014, it still remains well below the developed economies where corporate bond markets contribute about 80% of total credit to the system (Sengupta and Anand, 2014). The problem that arises with such heavy dependence on the banking system is that banks become over-sized on account of excessive borrowings from large corporate houses (Hakansson, 1999) leading to stretched balance sheets and non-availability of funds for the mid-sized corporate (Korivi and Rachappa, 2012; Korivi and Tandon, 2013).

A well developed corporate bond market allows for diversification and reducing of systemic risk (Hakansson, 1999). It also makes possible the access of cheaper sources of capital for firms without putting pressure on the limited funds of the banking system (Sprčić and Wilson, 2007). Eichengreen (2006) points out that while banks are an integral part of the financial intermediation process and have a clear advantage over bond markets in funding of smaller sized firms, they cannot work in silos. Bond markets and banks are subject to different risks and hence both need to be adequately developed to allow for a strong financial system.

The Indian banking system has been under tremendous strain over the last financial year. With some of the biggest corporate houses defaulting on their loans, there has been a big pile up of non-performing assets (NPAs) and a massive hit to the profitability of banks. As a result, credit to the system has dried up with credit growth slowing to multi-decade lows of 5.1% as of December 2016. This dismal condition of the banks has allowed the corporate bond market in India to come into focus and for issuers to give it adequate consideration for raising of funds. As per data released by SEBI, total corporate bond issuances in calendar year 2016 (both via public issues and private placements) went up by a massive 28% as compared to the year 2015. Public issuances have almost doubled from Rs. 21,547 Crores to Rs. 41,826 Crores indicating strong demand from retail investors as well.

In August 2016, a Report of the Working Group on Development on Corporate Bond Market in India, headed by then Deputy Governor of Reserve Bank of India (RBI), H.R.Khan, was released. The report addressed suggestions for deepening the bond market based on the 7i Framework. The RBI Governor, Dr. Raghuram Rajan soon announced reforms based on the finding of the Working Group which was received positively by all market participants. These suggestions and reforms are discussed in detail in Section 3 of this paper.

The year also saw interest rates nose-diving based on monetary policy actions as well as global cues. In addition, the surprise demonetization announced by the Prime Minister in November 2016 resulted in banks being flushed with liquidity pushing rates further down. As a result, debt mutual funds saw a renewed interest. There was also high demand for high yielding corporate bonds, tax-free bonds, etc as investors looked for a yield pick-up.

All these positive factors in 2016 have resulted in an upturn in the activities in the corporate bond market in India. The momentum is expected to be sustained in the coming period as well as the reforms introduced take full effect.

The structure of this paper is as follows: **Section 2** covers the existing body of literature that have identified issues and challenges on corporate bond markets in India in the past; **Section 3** assesses the regulatory changes that were made in 2016 and its impact on the market through the 7i Framework; **Section 4** classifies the data collected through newspaper articles for calendar year 2016 within RBI's 7i Framework to determine which of the 7i's has seen maximum impact and which require further attention; **Section 5** summarizes the findings and arrives at the conclusions.

Section 2: Literature Review

Post the Asian Crisis of 1997-99, there was a realization that in the absence of a well-oiled bond market, there would be inefficiencies in the financial system (Herring and Chitusripitak, 2000). In India, the policymakers set up a high-level committee under the guidance of R.H. Patil to determine the factors that were constraining the development of corporate bond markets in India.

Patil (2005) highlighted that there was a requirement of a suitable infrastructure and framework to support market-making and allow markets to evolve. The condition of the market then was such that there was no transparency, reliability, timeliness or investor diversity (Raghavan *et al.*, 2014). In addition, a liquid government bond market was necessary to allow for pricing of corporate bonds, along with strong regulatory frameworks as had been evidenced with developed economies (Luengnaruemitchai and Ong, 2005). Khanna and Vattoril (2012) have pointed out that weak legal structures especially pertaining to taxation and bankruptcy laws have been a cause of a constrained corporate bond market (Thukral, 2016).

The importance of developing an efficient secondary market was also pointed out which would include a platform for trading, settlement, clearing and reporting of securities on lines similar to that of the government bond market. (Patil, 2005; Thukral *et al.*, 2015).

Suitable infrastructure would also include an adequate credit assessment process including ratings and credit enhancement.

Over the last couple of years, the clearing houses of stock exchanges have a transitory pooling account facility for the settlement of Over the Counter (OTC) trades. In addition, there is now an online trading platform provided by the stock exchanges which however has lackluster trading. Khan (2015), while addressing 'infrastructure' as one of the components of the 7i Framework, has stated that this was on account of high margins, penalties and absence of DvP-III settlement like in the case of government bond markets. He has also brought to attention the heavy dependence on credit rating agencies and the lack of independent credit appraisal.

Concentration of demand and supply in the hands of a few players has been a reason for illiquidity in the bond markets. While demand is skewed towards institutional investors like insurance companies, mutual funds, pension and provident funds, supply is

led by public sector financial institutions. The institutional investors are driven largely by the regulatory prudential norms as well as their asset-liability requirements that restrict the amount that they can invest in corporate bonds. (Thukral *et al.*, 2015). While Foreign Portfolio Investors are permitted to invest in the market, the amount is restricted by RBI. Retail participation, although minimal, has seen a pickup in 2016 with more public issues and tax free bonds on the offer. Khan (2015) has emphasized on the easing of investment guidelines for institutional investors to allow for more participation.

On the supply side, high issuance costs and differential stamp duty rates have been a pain point for issuers (Raghavan and Sarwono, 2012). The Patil Committee report suggested bringing uniformity in these rates to increase the number of issuers, a point that was also reiterated by H.R. Khan as part of the 7i Framework while addressing Issuers. Khan (2015) also stated the need to allow for re-issuances of existing bonds that will increase liquidity in the secondary market as well as lower costs.
Luengnaruemitchai and Ong (2005) and Mitra (2009) have brought attention to the lack of innovative debt-instruments that have constrained the growth of the market. Absence of credit default swaps and other derivative products also makes risk management a concern for investors. Operational issues in trading innovative instruments like corporate bond repos and Additional Tier-I Capital Bonds have also limited their trading.

Section 3: Big Bang Reforms under RBI's 7i Framework

To provide corporate bond market in India the impetus that it needed post the recommendations of the Patil Committee Report, the then Deputy Governor of RBI, H.R. Khan developed a "7i Framework" that incorporated all the important components that were imperative for a vibrant corporate bond market. These 'I's are as follows:

1. *Investors*
2. *Issuers*
3. *Instruments*
4. *Infrastructure*
5. *Intermediaries*
6. *Incentives*
7. *Innovation*

In September 2015, the Sub-Committee of the Financial Stability Development Council (FSDC) constituted a Working Group on Development of Corporate Bonds under the chairmanship of H.R. Khan. In August 2016, the Group made its recommendations that were grouped under the 7i Framework. Some of these recommendations were taken on board by the RBI and necessary reforms were announced. The recommendations as well as the measures announced by RBI are discussed in this section.

Investors

In order to widen the investor base, the Group has sought to simplify the way FPIs invest in the corporate bond market. The recommendation is to permit them to invest in unlisted bonds and Pass Through Certificates (PTCs) issued by SPVs. In addition, the FPIs may be permitted to trade in the corporate bond market directly, without involving brokers. The RBI, in

consultation with SEBI, has agreed to take this recommendation forward.

Issuers

The efforts made by the regulators and policymakers to increase the issuances in corporate bond markets have paid off handsomely as primary issuances from Rs. 1.74 trillion in 2008-09 to Rs. 4.91 trillion 2015-16 which is an increase by 181% (*Source:* SEBI). The area of worry now remains with the liquidity in the secondary markets where daily trading average is a mere Rs. 2,000 Crores. The Group has recommended re-issuing the bonds with same ISINs instead of new securities as typically the fresh issuance becomes liquid and the older paper by the same issuer becomes illiquid. The concern is that this might lead to concentration of liabilities in single maturity buckets. However that can be remedied by offering staggered maturities on the bond. These re-issuances will not be subject to stamp duties thereby reducing the cost for the issuer as well. The Group has also recommended standardization of yield and cash flow conventions for corporate bonds (similar to government bonds). This will help in avoiding pricing issues in the secondary market.

Instruments

The Group has addressed the lack of interest and trading in several of the Instruments that are currently available but not actively traded. These are as follows:

a. Credit Default Swaps (CDS): The high capital requirement for positions in CDS have deterred banks and Primary Dealers (PDs) from trading. This is on account of RBI not permitting the netting of positions with same counterparty due to lack of legal clarity. The report recommends amending the RBI Act at the earliest to allow this.

b. Repo in corporate bonds: This hasn't taken off primarily on account of operational issues. The report recommends an electronic platform similar to CROMS for repo in government bonds with a clearing party like CCIL. In addition, a common acceptable agreement should be made for execution by FIMMDA, tripartite repo, market makers permitted as participants etc may also be considered to improve trading.

c. Basel III - Perpetual Bonds (AT-1): Banks are expected to issue as much as Rs. 80000-85000 Crores of AT-1 bonds in the coming year. However in the last year there has been negligible demand of these bonds and the cost of debt for the banks has been very high. This is primarily due to the regulatory hurdles posed by the insurance, EPFO, PF regulators which either restrict the amount to be invested in these bonds, cap the credit rating to AA or higher or have not included these in the list of permissible investments. There is also the competition from the large amount of Tax-free bond issuances that are attractive to HNIs and corporate. The report recommends that the IRDA, EPFO, PFs relook at their investment guidelines to allow investment in the bonds with credit rating up to investment grade.

d. Bond Index: There is a need to develop a suitable Bond Index as highlighted by the report.

Infrastructure

The primary segment of the corporate bond market is dominated by private placements.

This is because of the low cost, speed of issuance as well as the requirement of minimum disclosures. However, the downside of this is that a large number of investors remain excluded from this process. In order to improve transparency and access in the private placement process, SEBI allowed stock exchanges to introduce an Electronic Book Mechanism (EBM) for issues over Rs. 500 Crores where bidding could happen online. This was launched in April 2016. The Group has now recommended that EBM be used for all issues by private placement.

In addition, in order to encourage trading on the electronic trading platform, which is currently very low, the Group has proposed that clearing houses of stock exchanges develop mechanisms similar to those in equity markets in order to deal with delivery failures. Alternatively, borrowing through corporate bond repos may also be explored for settlement.

The Group has also recommended that for Credit Rating Agencies, the compliance procedures need stricter adherence. RBI may also consider that they access credit information through CICs.

Also, as per the Budget recommendation, an Integrated Trade Repository needs to be set up at the earliest so that investors have complete access to information for both primary and secondary corporate bond markets.

Intermediaries

In order to facilitate and improve liquidity in the secondary corporate bond market, the Group has recommended having a market making scheme that will allow investors both entry and exit options. Stock exchanges have been asked to operationalize a scheme to allow for market making after approval from SEBI. In addition banks and Primary Dealers may also be encouraged to act as market makers in addition to brokers. Brokers may also be given access to the repo market to enable them to become market makers.

Incentives

The following Incentives are recommended by the Group to improve the bond markets:

a. Credit Enhancement of bonds: Currently the Partial Credit Enhancement (PCE) that banks are able to provide is limited to 20% which is inadequate to boost the credit ratings to the desired AA (required by most categories of investors). This is recommended to be increased as well the need for a separate regulatory framework to address this is felt. The RBI undertook this recommendation of the group and this limit has been increased from the present level of 20% to 50% of the bond issue size subject to the PCE provided by any single bank not exceeding 20% of the bond issue size.

b. Encouraging corporate to tap capital markets instead of banks: The report identifies the reason for preference of banks over markets is the availability of the cash credit facility. As addressed by the Budget for 16-17, the report also suggests that it should be mandatory for large borrowers above a certain cut-off limit, to tap the market to meet their funding requirements. The RBI has issued guidelines in this regards where a borrower having an aggregate sanctioned credit limit of Rs. 25,000 Crores must access the corporate bond market for their funding requirements.

c. Risk weights for PDs be reduced for corporate bonds: The risk weight for even AAA corporate bonds for standalone PDs is 100% while its 20% for banks. This discrepancy is sought to be removed to bring them at par and improve participation.

Innovation

The innovations that are recommended by the Group are as follows:

a. Corporate Bonds for Repo under LAF: Acceptance of corporate bonds as collateral under Central bank's liquidity management framework may incentivize banks and PDs to invest in corporate bonds and thereby create demand for corporate bonds. The RBI is actively considering corporate bonds as eligible collateral for liquidity operations. The process to make necessary amendments to the RBI Act has commenced.

b. Stamp duty Rationalisation: These should be uniformity across states on the stamp duty to be levied and it should be linked to the tenor of the securities with an overall cap. In addition, re-issuances of bonds should not draw additional stamp duty.

c. Bankruptcy Act and SARFAESI Act: An effective bankruptcy regime is integral to the development of corporate bond markets. New bankruptcy code 2016 has been passed and it is expected to address the concerns of investors with regards to recovery and resolution process.

Section 4: Data Collection and Methodology

Availability of data for the corporate bond markets is mostly aggregated data available with SEBI, RBI, NSE BSE, Prime database, Bloomberg etc and is concentrated primarily on issuances as well as investments by various classes of investors. To have a better understanding of how the market is evolving, it is necessary to look at data on a more granular level. For this purpose, we have decided to look at data in the form of press releases which are published in the leading financial dailies for the calendar year 2016. We have also compared the findings for the year with the previous year i.e., 2015 to bring in more clarity. All news items pertaining to the corporate bond markets have been considered. The newspapers that have been considered are as follows (in alphabetical order):

1. *Business Line*
2. *Business Standard*
3. *DNA*
4. *Economic Times*
5. *Financial Express*
6. *Free Press Journal*
7. *Hindu*
8. *Hindustan Times*
9. *Indian Express*
10. *Live Mint*
11. *Times of India*

In the calendar year 2016, assuming a total of 366 days, adjusting for weekends and public holidays, there are about 250 working days. Against this, the researchers have collected 351 published news reports. This is a little over 140% of information hit, or in simple words, there is more than one news article pertaining to the corporate bond market published every day. (Annexure 1)

We have assessed the published information in each newspaper report keeping the RBI's 7i Framework in mind. Each piece of news has embedded within in it potentially 7

aspects of the bond market – Investors, Issuers, Intermediaries, Instruments, Infrastructure, Incentives and Innovation. This information is classified under the respective head. This is not mutually exclusive, implying that each piece of news item will have at least 1 classification and a maximum of 7 classifications (only 1 per head for 1 piece of news). On an aggregate, there are 773 classifications for the 351 published news reports analyzed.

We will now look at this information at a further granular level to get a better understanding of data.

Investors

The total classifications under the head of Investors is 149 or 19.3% of the total information captured. This is slightly below 2015 where this category saw a 21.2% hit. A study of the press releases under this category pertains broadly to the following:

a. *As seen in 2015 as well, Tax-Free Bonds remained very popular among retail and HNI investors being oversubscribed several times.*
b. *Apart from tax-free bonds, retail investors showed great enthusiasm for other public issues like Dewan Housing Finance Limited (DHFL), as bank fixed deposit rates remained low.*
c. *SEBI came down heavily on Mutual Funds post the Amtek Auto fiasco in 2015 by tightening prudential norms for them to bring down the credit risk.*
d. *RBI has permitted FPIs to invest in corporate bonds directly without going through a broker.*
e. *Large Institutional investors like LIC, EPFO and Mutual lapped up capital bond issuances by banks in search of higher yields.*
f. *The year also saw default by big corporate houses like Jindal Steel and Power Ltd and JP Associates as well as by banks like Dhanalaxmi Bank being unable to service its upper tier II debt, which hurt investor sentiment.*

Issuers

The total classifications under the head of Issuers is 314 or 40.6% of the total information captured which is the same as the previous year. A study of the press releases under this category pertains broadly to the following:

a. *The year was dominated by banks issuing additional tier I capital bonds to meet the Basel III norms as well as improve their low capitalization on account of massive NPAs.*
b. *Issuers like NHAI, IRFC, IREDA, NABARD, HUDCO, etc successfully raised large sums via tax-free bonds*
c. *Other issuers like DHFL, Reliance Jio, M&M Finance, Tata Power, Muthoot Finance, Reliance Power, Piramal Enterprises, Adani, Apollo Tyres, Srei Equipment etc also tapped the corporate bond markets as bank credit slowed.*
d. *PNB Housing Finance issued Green Bonds.*
e. *RBI's norms on limiting bank credit to large corporate houses will bring more issuers to the corporate bond market.*

Instruments

The total classifications under the head of Instruments is 98 or 12.7% of the total information captured. This was an

improvement from 2015 where it was 10.2%. A study of the press releases under this category pertains broadly to the following:

a. *Additional Tier I capital bonds and Perpetual bonds remained the focus of issuances this year.*
b. *DHFL launched a CPI linked bond, where coupon was linked to the inflation rate which saw massive interest from investors.*
c. *Experts have called for developing a junk bond market to create depth in corporate bonds.*
d. *IFC reissued Maharaja Bonds during the year.*
e. *UDAY bonds launched saw good demand.*
f. *Recommendations on developing CDS, Corporate Bond Repo and a Corporate Bond Index are under consideration of regulators.*

Infrastructure

The total classifications under the head of Infrastructure is 67 or 8.7% of the total information captured. This was a big step up from the previous year where the focus on infrastructure was less than 2%. There has been a big push to improve the liquidity and transparency in the market through various initiatives. A study of the press releases under this category pertains broadly to the following:

a. *An E-book platform was launched on the stock exchanges which allows for online auction in a privately placed issue. The platform got great response from participants and was widely accepted.*
b. *Credit Rating agencies remained in focus with regulators calling for stricter rules for them to ensure timely rating actions. The 'agency problem' pertaining to the 'issuer pays' model that rating agencies follow was also discussed.*
c. *Rating agencies remained busy as several bank bonds were downgraded*
d. *NSE launched a trade repository during the year.*
e. *New initiatives like setting up a credit enhancement fund, new bankruptcy code etc were introduced that will improve the overall infrastructure of the market.*

Intermediaries

The total classifications under the head of Intermediaries is 42 or 5.4% of the total information captured which is below 6.6% in 2015. A study of the press releases under this category pertains broadly to the following:

a. *To improve liquidity in secondary market, reports have discussed allowing PDs to be market makers and giving repo access to brokers so that they can assist in market making.*
b. *Axis Bank remained the leading merchant banker during the year while SBI Capital rose 12 notches higher in the league tables. Other leading arrangers were ICICI Bank, HDFC Bank, AK Capital and Edelweiss Finance.*

Incentives

The total classifications under the head of Incentives is 20 or 2.6% of the total information captured similar to 2015. A study of the press releases under this category pertains broadly to the following:

a. *Increase in Credit enhancement from 20% to 50% of bond size to improve rating*
b. *Allowing corporate bonds for repo under LAF*
c. *Large borrowers to mandatorily access the corporate bond market beyond a cut-off limit*

Innovation

The total classifications under the head of Innovation is 83 or 10.7% of the total information captured, much below the 17% in 2015. A study of the press releases under this category pertains broadly to the following:

a. *Innovation in the kind of bonds like Tax-Free Bonds, Green Bonds, UDAY Bonds, Maharaja Bonds, CPI Linked Bonds etc continue to drive markets*
b. *LIC, SBI and IIFCL partner together to set a credit enhancement fund*
c. *Allowing corporate bonds for repo under LAF*
d. *Building a Corporate Bond Index*

Section 5: Summary and Conclusions

As we look at the data more closely we find that there is an increase in newspaper reports from 253 in 2015 to 351 in 2016 indicating that corporate bond market in India is finally coming into its own. It may be important to highlight at this point that while there is concentration of news on issuers and investors, this year saw several editorial and opinion reports that had discussions on the importance of developing the corporate bond market which included an interview with H.R Khan as well. To summarize:

a. *The stress on the banking system needs to be diversified and a developed corporate bond market is now a necessity.*

b. *Issuances continue to grow as more issuers turn to the bond markets. This should further increase as RBI's mandate on large borrowers accessing the market kicks in.*

c. *Focus on improving infrastructure should see improved secondary market trading which is currently still illiquid. This includes adding more intermediaries (not seen much attention this year) and market makers.*

d. *Quick turnaround by regulators on the recommendations made by Working Group Report is necessary especially on aspects of legal impediments like Bankruptcy Code.*

e. *More incentives maybe needed to ensure the momentum remains sustained.*

While there is no doubt that 2016 was a shining year for corporate bond markets, there remain some risks that must be considered. In an article in Mint, Anjali Sharma, research consultant at IGIDR points out that most of the measures undertaken currently are 'neither new nor likely to have significant impact' as most of these were recommended by the Patil Committee in 2005. Lack of regulatory action and inter-regulatory co-ordination has slowed the process and the large bias of investment regulations of insurance and pension funds towards government bonds remains restrictive. These are valid concerns, however given the inability of the banking

system at its current state to meet the credit requirement of the economy; the corporate bond market must be seen as a viable option.

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Tables

Annexure 1: News Summary on Corporate Bond Markets in India Calendar Year 2016

News Summary on Corporate Bond Markets in India Calendar Year 2016

Month	Issuer	Investor	Instrument	Intermediary	Innovation	Incentive	Infrastructure
January	35	21	14	3	19		6
February	25	8	9	3	7	1	7
March	34	18	10	2	12	2	5
April	22	12	7	4	8		5
May	26	11	2	2	3		5
June	10	2	2	1			
July	35	13	6	6	6	2	10
August	63	38	31	14	19	13	23
September	28	18	9	7	7	2	5
October	15	4	6		1		1
November	3	2					
December	18	2	2		1		
Total	**314**	**149**	**98**	**42**	**83**	**20**	**67**
Grand Total	**773**						

Source: Copyright: © Sunder Ram Korivi, NISM

BANGLADESH STOCK MARKET BUBBLE BURST: THE TRANSGRESSION OF ECONOMIC FACTORS

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Abstract:

The study strives to find out the root economic causes that helped create Bangladesh capital market bubble and subsequent burst. Our study findings confirm that CRR, FDI, deposit rate, turning black money into white money, banks' exposure to capital market, and margin loan had contributed to the creation of bubble, while money supply and GDP growth had no influence on the same. Moreover, Bangladesh Bank's policy to control money market had aggravated the volatility in capital market. When the artificially created high prices inevitably fell, the bubble burst and most let alone investors were shaken out of the market.

Key Words:

Macroeconomic Factors, Stock Market Crash, Bubble Burst

1. Introduction

Bangladesh capital market is the third largest in South Asia with two full-fledged automated stock exchanges namely Dhaka Stock Exchange (DSE) and Chittagong Stock Exchange (CSE) (Unnayan Onneshan, 2011). But the market is still underdeveloped and one of the smallest markets in Asia (Rasul, 2013). Although, the history of Bangladesh

stock market is of more than six decades, small size, low and unstable liquidity, low foreign investment, weak regulatory framework, lagging development of bond market, information asymmetry, lack of professional expertise of market participants, inadequate knowledge and skills in using risk management tools, lack of awareness and proper knowledge of investors, and absence of different products are the characteristics of this market (Choudhury, 2013; Rasul, 2013).

Stock markets of most of the countries including developed economies have had the taste of collapse at least once. To date Bangladesh capital market has experienced two crashes - the first one was in 1996 and the latest one was during 2010-11.

The 1996 market crash was due to the burst of speculative bubble (Sarker & Nargis, 2012). A bubble describes a state of an overvalued market in which stock prices deviate from the fundamental price of an asset. (Homm & Breitung, 2012; Mahmoud, Naoui, & Jemmali, 2013). Speculative bubbles occur due to opposite expectations about other traders' valuations of the asset (Ball & Holt, 1998). During speculative bubble hyperbolic expectation for price appreciation, or other psychological factors augment asset values, which leads to higher trading volumes, and as more investors are attracted to heightened prospect, buyers outnumber sellers, pushing prices ahead of intrinsic value.

The 2010-11 Bangladesh stock market crash was a part of the ongoing stock market havoc in both the stock exchanges. The reasons that might be liable for it were uninformed let alone investors, accounting manipulation, insider trading, unusual increase in Net Asset Value (NAV) through revaluation of fixed assets along with some psychological factors such as greed, envy, and speculation (Yao & Luo, 2009). A series of newspaper reports and articles, and also a few journal articles, in addition to the probe committee report headed by Khondoker Ibrahim Khaled, have attempted to find out the causes behind the crash. But none of the study is fact-based and comprehensive to find out the root economic causes of crash in 2010-11.

In this context, the present study has been planned to give a clear insight on the root economic causes that lead to the formation of bubble and subsequent burst. More specifically, the paper aims to explore the leading economic causes of Bangladesh stock market upheaval in 2010-2011 and to suggest a pragmatic roadmap for strengthening the feeble market.

The rest of this paper is organized as follows. Section two presents the review of literature; section three deals with factors and methodology; section four presents an overview of the stock market crash in Bangladesh; section five presents the findings and discussion followed by concluding observation in Section six.

2. Review of Literature

A good number of researches are done to study the impact of macroeconomic factors on stock prices and some of these studies disclose that the changes in the fundamentals of an economy greatly influence stock market indices (Ahmed, 2008). Some researchers found significant relationship between macroeconomic variables and stock market (Maysami, Howe, & Hamzah, 2004; Coleman & Tettey, 2008;

Tsoukalas, 2003; Horobet & Dumitrescu, 2009; Büyükşalvarcı, 2010; Geetha, Mohidin, Chandran, & Chong, 2011; Kalyanaraman & Tuwajri, 2014). Others found no significant relationship between them (Muhammad, Hussain, Ali, & Jalil, 2009). While another group found that some variables have significant relationship and some do not have (Kurihara, 2006; Pal & Mittal, 2011; Sikarwar, Mehta, & Varsha, 2011; Ullah, Hussain, & Rauf, 2014).

Macroeconomic factors are important determinants over the long investment perspective, because, as expressed by (King, 1966), share prices are exposed to macroeconomic factors by an average of 50 percent. Fama, (1981) examined and found a positive relationship between economic activities and stock returns (US), but a negative relationship between stock returns and inflation rate. Musílek (1997) maintained that macroeconomic variables affect stock prices. Aidoo, (1989) observed that political instability, low growth rate and too little demand for stocks are likely to influence the performance of Ghana Stock Exchange.

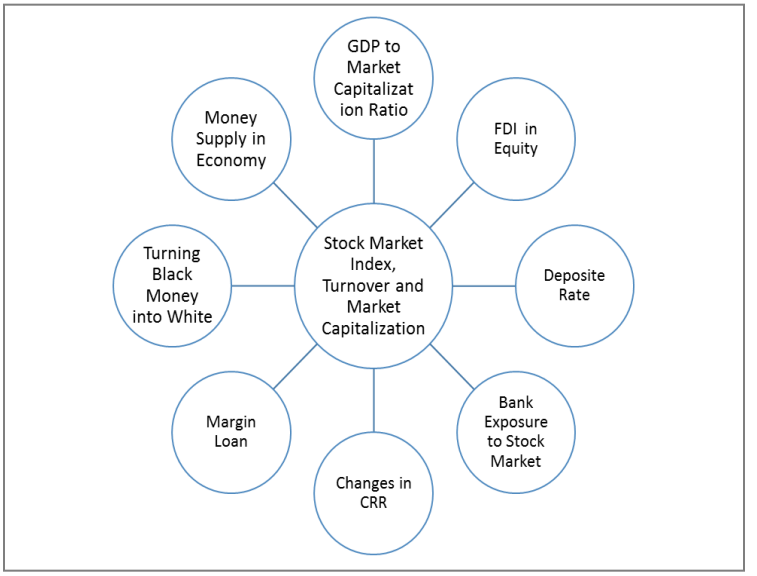
Fung, (1990) studied the long term relationships between stocks return and GNP, inflation and money supply. Poon & Taylor, (1991) found that macroeconomic and fiscal environment is one of the cornerstones of determining the success or failure of any stock market. ZHAO, (1999) found that both inflation and expected growth in industrial output have negative relationships with stock market. Kwanchanok, (2000) found that the inflation rate, money supply, trading volume of securities, and exchange rate system have positive effects on the Thai stock market, whereas the interest rate and GDP have negative effects. But, (Thorbecke, 1997) observed that a reduction in interest rate increases liquidity that could drive up the prices of securities.

In the above context, the aim of this study is to explore the nature of relationship between important macroeconomic factors and Bangladesh capital market volatility in 2010-11.

3. Methodology of the Study

The study is basically an empirical study based on secondary data. Necessary secondary data was collected from different relevant research studies, national and international dailies, websites of Bangladesh Securities and Exchange Commission (BSEC), Bangladesh Bank (BB), DSE, CSE, and corporate entities. Although related literatures have been studied in relation to the 1996 stock market crash, a large portion of data regarding market conditions, changes in rules and regulations regarding Statutory Liquidity Reserve (SLR), Cash Reserve Ratio (CRR), exposure to capital market, and market index were collected during 2006-2013. The collected data has been arranged, tabulated and presented in appendix tables. The macroeconomic and some other related factors that might have influenced stock market index, turnover and market capitalization are shown in the diagram:

Figure 1: Factors that helped create Bangladesh stock market bubble and subsequent burst in 2020-11.



4. Overview of Bangladesh Stock Market Crash:

The year 1996 is marked as the worst year for Bangladesh capital market. DSE General Index rose from 365.3 on November 4, 1991 to 3648.8 (10 times) on November 5, 1996 (Dhaka Stock Exchange Limited, 2013). Between 1991 and 1995, DSE General (DGEN) price index rose by around 182 percent (Dhaka Stock Exchange Limited, 2013). Subsequently, in 1996, the rate of appreciation took a striking turn with a 4.9 times increase during the 10 months period. This sharp increase in the general index was an obvious indicator of bubble formation. In less than six months, as the bubble burst, DGEN index dropped to 957 in April 1997 (Dhaka Stock Exchange Limited, 2013), erasing gains of the previous ten months. The market slowdown continued for the next 7 years until April 2004, during that period, DGEN index barely crossed 1000.

The 2010-11 Bangladesh stock market scam was a part of the ongoing stock market turmoil in both the stock exchanges. The stocks were overvalued this time where price was inflated about 500-700 percent compare to NAV. Since 2006, Bangladesh stock market had started increasing gradually and by the end of 2010 it was awfully overvalued and overheated, and it outperformed almost all the stock markets in the globe (Bhuiyan, 2010). The market turmoil began this time with the entrance of GrameenPhone into the capital market, when the index rose by 22 per cent in a single day on November 16, 2009. Share prices continued to fluctuate, reaching the

all-time high on December 05, 2010 at 8918 from 5310 on January 27, 2010 – a 67.94 percent increase (The Financial Express, 2012). But on January 10, 2011, trading on DSE was halted after price index fell by 660 points, or 9.25 per cent, in less than an hour. CSE also met the same fate (The Financial Express, 2012). An abrupt crash of the market sparked violent protest from the investors. In this situation, BB, the Central Bank of the country, took a conservative move to control excess liquidity and cool the market. But those measures adversely affected the capital market and share prices continued to fall sharply. Around 3.3 million people affected by the market crash 2010-11 (Choudhury, 2013). Since then the market has been very sluggish and small investors being frustrated with huge loss during the crash are no more interested in share market.

5. Findings and Discussions

It is evident that many initiatives were taken to control the turbulence but none of them worked. Based on the secondary sources of information, the factors that could have contributed to the formation of stock market bubble and subsequent burst in terms of turnover, market capitalization and stock market index have elaborately been discussed in the following two sub-sections. The first subsection presents the changing scenario of stock market turnover, market capitalization, and stock market index over the period of study and the other subsection presents the factors responsible for the changes on the above three factors.

5.1.1 Turnover

It is evident from appendix table 01 that the total turnover increased dramatically to 497, 207, 221 and 272 percent from 2007 to 2010 respectively over the previous year. Altogether the total growth in turnover increased about 62 times in 2010 over 2006 and the increase was more pronounced in 2007 at about 5 times over the previous.

But the post 2010 scenario tells us a different story when the turnover had started dropping alarmingly and continued till 2013. The highest drop was noticed in 2011 at about 61 percent over the previous year. The turnover also dropped by 36 and 5 percent in 2012 and 2013 over the previous year. In total, the market witnessed a 76 percent drop in turnover from 2010 to 2013, which suggests the market has completely collapsed after the stock market scam in early 2011. Thus, it could be concluded that the market manipulation was started in 2006 and reached to the highest level in 2010 and thereafter the market crashed in early 2011 and continued till 2013 and then the market has started fluctuating with insignificant ups and down, but virtually no improvement to date.

5.1.2 Market Capitalization

Both in absolute term and in relative term the same scenario is observed in market capitalization. Appendix table 01 reveals that in absolute amount market capitalization increased to BDT 3,064 billion or 11 times in 2010 from BDT 276 billion in 2006. The market capitalization surged to 273 percent, 141 percent, 144 percent and 201 percent in each year from 2006 to 2010 respectively. But the post 2010 scenario was completely different where the market experienced a sudden fall in capitalization at 15 percent in 2011 and 8 percent in 2012. There was an insignificant improvement in Market Capitalization due to inclusion of 137

new IPOs (13 in 2006, 14 in 2007, 15 in 2008, 15 in 2009, 25 in 2010, 24 in 2011, 14 in 2012, and 17 in 2013) during 2006 to 2013. Negative growth was noticed even after the inclusion of these IPOs. This situation suggests a serious setback in the normal functioning of the market.

5.1.3 Stock Market Index

DSE General Index (DGEN) also showed an unusual uptrend during 2006 to 2010. In 2006 the DGEN was at 1609 which rose by 88 percent to 3017 in 2007 after that there was a little drop of 7 percent in 2008. Again, in 2009 the index ascended by 62 percent and reached at 4535 and in 2010 the index further rose by 83 percent and reached to 8290. However, in 2011 the index plunged drastically to 5258, which was a 37 percent drop from 2010. Again in 2012, the market experienced a 20 percent drop in DGEN that led to 4219 point. During 2010 to 2013, the lowest DGEN was 3616 on February 02, 2012 and the highest was 8919 on December 05, 2010 – the difference was 5303 points.

5.2.1 GDP to Market Capitalization

It appears in appendix table 01 that the GDP growth was 6.67 percent, 7.06 percent, 6.01 percent, 5.05 percent and 5.57 percent as against the growth in market capitalization to GDP ratio of 6 percent, 15 percent, 19 percent, 27 percent and 50 percent during 2006 to 2010. But after 2010, the market capitalization to GDP ratio had set a declining trend and it is observed that market capitalization to GDP ratio was 40 percent in 2011, 35 percent in 2012 and 36 percent in 2013 as against the GDP growth for the same period of 6.46 percent, 6.52 percent and 6.01 percent respectively. A declining trend in market capitalization to GDP ratio was noticed even after the inclusion of a large number of IPOs. Thus it may be concluded that the growth in GDP did not contribute to the growth in market capitalization.

5.2.2 FDI in Capital Market

The first 11 months of 2008 saw a sequence of adverse financial news around the world, triggered by the US credit crunch and housing market crisis (Yao & Luo, 2009). This poor external financial environment might have had an impact on Bangladesh stock markets. It is evident from appendix table 02 that FDI in Bangladesh stock market increased by 23.84 percent, 3.86 percent and 17.48 percent during 2005-2008 respectively followed by 1.88 and 3.79 percent drop during 2008-2010 respectively. But in 2010-2011, Bangladesh capital market experienced a major fall of 51.48 percent in FDI. After that the FDI increased by 81.68 percent and 67.59 percent again during 2011-2013 respectively. If we pay a closer look into FDI in Bangladesh Stock Market during July 2009 to June 2011 altogether we find that it increased by 254.0 percent during January- June 2010 over July – December 2009. However, during July-December 2010 it reduced dramatically by 71.0 percent over January-December 2010. This situation suggests that international gamblers were involved with local players and they adopted the cherry picking policy for a short period and escape the market with abnormal capital gain before the burst of artificially created bubble.

5.2.3 Deposit Rate

The changes in bank deposit rate usually affect capital market investment. The less

the interest on deposit, the more the investment in capital market and vice versa. Against this backdrop, it is observed in appendix table 03 that there was a downtrend in bank deposit rates that might have contributed to the creation of bubble. The weighted average interest on deposit (WAID) fluctuated between 6.01 percent in the second half of 2010 and 7.33 percent in the second half of 2008 with a decreasing trend during the period of review. However, in the first half of 2011 the WAID increased to 7.27 as against 6.07 in second half of 2010, which might have also expedited the burst of the bubble at the beginning of 2011. Thereafter, the WAID had an increasing trend till end of 2013. Instead of reducing the bank deposit rate to boost up the capital market, BB had increased it significantly from the first half of 2011.

5.2.4 Bank Exposure to Stock Market

Whether central bank should play any role in bursting asset bubble is a matter of debate. If they want to do it they should do it without affecting the stability of the capital market. Commercial banks in Bangladesh became the key investors in capital market by putting a huge amount of money and thereby exposed themselves to high risk. Allowing merchant banking has made the situation more vulnerable. Perhaps, BB was not much aware of commercial banks' exposure to stock market and they had insufficient data regarding the same. Surprisingly, banks' profits from investment in stock market were seemed to be negligible according to their income statements although there was a wide perception that banks made supernormal profits from investing in shares and debentures during the bubble period (2006-2010). Proper data on their exposure to the capital market remained unknown (The Daily Star, 2011).

The central bank had started pulling the rope to minimize the banks' investment in capital market from the last-half of 2010, when the index had increased to an alarming level. The situation aggravated when it was made obligatory for all banks to keep their investment in the stock market within 10 percent of their total deposit and to comply it by December 2010, when in fact, the ratio was much higher than this level. Reducing banks' exposure to stock market compelled banks to sell huge volume of shares, which also caused share price to decline. In reality, any action to limit banks' exposure to stock market could upset the market significantly.

5.2.5 CRR Changes

Increasing the CRR may induce a bank to offload a part of its investment in stock market. Normally, the more the CRR, the less the liquidity a bank will have and hence the less the investment in capital market and vice versa. In this context, it is found in appendix table 04 that CRR was 5 percent since October 01, 2005 and continued till December 14, 2010 and from the next day it increased to 6 percent. Thus, the increase in CRR from December 2010 might have a significant role on the burst of the bubble as quite a few banks had to offload a huge volume of their investment in stocks due to liquidity constraints. Reducing banks' exposure to stock market and increasing the CRR were double debacle for Bangladesh stock market.

5.2.6 Turning Black Money into White through Investing in Secondary Market

Political situation of a country may affect the volume of investment in capital market. Unstable political situation has negative impact on investment and vice versa. In 2006, Bangladesh was in an unstable political situation and in the following year, army backed caretaker government took over the power to neutralize the situation. At that time both military and non-military high ups came to the market in large number that attracted plenty of general people. Since then Bangladesh capital market has started forming bubble and which continued till 2010. According to the probe committee, people came to stock market during the caretaker government period because of safety. Many businesses and bank accounts were under investigation with the suspicion of existence of black money. Whereas investment in capital market was free from such investigation. The record-breaking amount of BDT 100 billion was whitened during the tenure (2006-2008) of caretaker government (Shuvronath, 2009).

5.2.7 Margin Loan

Margin loan provides finance to the small investors having liquidity crisis to purchase securities. In Bangladesh, some brokerage firms and merchant banks provided excessive margin loan when the market was on a continuous bull run (Mufazzal, 2015). A few of them provided margin loans even several times of their capital base. At that time margin loans were provided with the ratio ranging between 1:1 and 1:1.5. But at present, the margin loan ratio is 1:0.5. After the catastrophe, brokerage houses and merchant banks were forced to sell securities of their clients to adjust margin loan accounts that could have expedited the burst of the bubble.

5.2.8 Money Supply in the Economy

Excess money supply in any economy could help create bubble. It is evident from appendix table 05 that the overall money supply in Bangladesh economy during 2006-2007 to 2010-2011 had an insignificant growth and thereafter it reduced significantly in 2011-12 and as such, unlike margin loan, money supply had no or very insignificant impact on the formation of bubble.

6. Conclusion

The 2010-2011 Bangladesh capital market crash was a big shock to the financial system of the country, not just because of the size of the drop in market capitalization, turnover, and index, but because the market functioning was awfully weakened. Our study findings confirm that market manipulation and formation of bubble were started in 2006 and reached to the highest level in 2010 and then the market crashed in early 2011 and continued till 2013. Thereafter, the market has started fluctuating with insignificant ups and down, but virtually no improvement to date. The growth in market capitalization was not in line with the growth in GDP. On the other side, FDI in Bangladesh stock market increased remarkably during 2005-2008. Thereafter, it was static till the first half of 2010. But during July-December 2010, it experienced a major fall in FDI (71 percent) just before the burst of the bubble. The situation even worsened when it was made mandatory for commercial banks to limit their investment in the stock market up to 10 percent of their total deposits and to

comply by December 2010. Increasing in CRR in addition to reducing banks' exposure to stock market was also a catastrophe. Obviously, big players had to sell huge volumes of shares due to liquidity constraints, which caused share prices to decline and helped the artificially created bubble to burst. Concurrently, army backed caretaker government took over the power in 2007 when the military and non-military high ups came to the market in large number that attracted a huge number of general people and since then Bangladesh capital market had moved rapidly to form bubble. Many businesses and bank accounts were under investigation with the suspicion of existence of black money. Whereas investment in capital market was free from such investigation and this practice was continued even after the political government took over the power in 2009. The National Board of Revenue (NBR) allowed people to turn black money into white through investing in secondary market that also accelerated the formation of bubble.

To avoid the recurrence of the situation BSEC, BB, DSE, CSE, NBR and the Ministry of Finance should work closely before formulating any monetary policy. The regulators especially BSEC and BB should keep an eye on the stream of FDI in the capital market to detect and control any abnormality. Monetary policy should respond to speculative or asset bubbles in a cautious manner in order to avoid economic distortions. Most importantly, the criminals involved in the whole process need to be brought to light and punished to create an example.

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Appendix

Table: 01 Movement of Factors

Factors	2006	2007	2008	2009	2010	2011	2012	2013
Total Turnover Value (BDT-bn)	65	323	668	1,476	4,014	1,561	1,001	953
% Changes in turnover		396%	107%	121%	172%	-61%	-36%	-5%
Market Capitalization (BDT-bn)	276	754	1,060	1,527	3,064	2,617	2,404	2,648
% Changes in Market Capitalization		173%	41%	44%	101%	-15%	-8%	10%
DSE General Index (DGEN)	1,609	3,017	2,795	4,535	8,290	5,258	4,219	4,267
% change in DGEN		88%	-7%	62%	83%	-37%	-20%	1%
Total Newly Listed Securities	13	14	15	15	25	24	14	17
GDP (BDT-bn) at constant market price	4,823	5,164	5,474	5,751	6,071	6,463	6,885	7,299
GDP growth	6.67	7.06	6.01	5.05	5.57	6.46	6.52	6.01
Market Capitalization to GDP (Ratio)	6%	15%	19%	27%	50%	40%	35%	36%

Source: *Compiled by the researcher from Monthly Review of DSE and Statistical Year Book 2014*

Table: 02 Movement of FDI in Equity (Million US$)

	2005-2006	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013
Jul-Dec	173.24	229.67	166.78	430.34	113.47	118.31	300.21	343.74
Jan-Jun	273.98	234.83	378.91	105.08	401.67	131.64	153.89	417.29
Total	447.22	464.5	545.69	535.42	515.14	249.95	454.1	761.03
% Change	23.84%	3.86%	17.48%	-1.88%	-3.79%	-51.48%	81.68%	67.59%

Source: *Survey Report January - June, 2015, Statistics Department, Bangladesh Bank*

Table: 03 Deposit Rate

Period	Rate	Period	Rate
30-06-06	6.68	31-12-09	6.33
31-12-06	6.99	30-06-10	6.01
30-06-07	6.90	31-12-10	6.07
31-12-07	6.77	30-06-11	7.27
30-06-08	7.00	31-12-11	7.52
31-12-08	7.31	30-06-12	8.15
30-06-09	7.00	30-06-13	8.54

Source: *Bangladesh Bank Annual Report (2006-14)*

Table: 04 Cash Reserve Ratio (CRR)

2006	2007	2008	2009	2010	2011	2012	2013
5%	5%	5%	5%	5%	6%	6%	6%

Source: *Bangladesh Bank Annual Report (2006-14)*

Table: 05 Increase in Money Supply

2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012
16.75%	17.63%	19.17%	15.70%	18.25%	12.10

Source: *BSEC Annual Report (2007-13)*

BREXIT AND FLUCTUATIONS IN THE SHARE MARKET IN INDIA AND ABROAD

Sharmistha Ghosh

Abstract:

United Kingdom's membership of European Union has contributed towards their economic prosperity to a considerable extent. On the other hand the share market is considered to be the barometer of a country's progress. Britain's exit from the European Union has led to a lot of speculation about its future impact on both the Indian and global stock markets. Financial markets before the poll already started to price in the risk of Brexit. It was also opined by many experts that Brexit will transmit shocks through several channels, the intensity of which would depend on policy developments and the time horizon considered. In this regard, the present paper aims at analyzing the impact of Brexit on the stock markets in India and abroad.

Key Words:

Brexit, Indices, European Union, Sensex, FTSE100

1. Introduction

The expectations of market participants express themselves in the stock prices. But of course the first days after the Brexit vote were not very informative on details since stocks co-moved downwards in an undifferentiated panic reaction. Brexit was intended following the June 2016 referendum in which 51.9% of votes were cast in favour of leaving the EU. Hence, June 23, 2016 became a notable day in history. The declaration of the Brexit victory was followed by the resignation of Mr. Cameron as Prime Minister. The value of the pound dropped as Brexit campaigners celebrated around the country. The impact was felt worldwide. The expectations of the market participants can be assessed from the behaviour of the stock markets. When Indian markets began trading in the week on Monday before Brexit, they had to factor-in the impact of Rexit i.e. the Reserve Bank of India Governor Raghuram Rajan's exit from

the central bank once his term finishes in September. Though markets opened with a modest cut, they recovered later in the day, mostly on account of the FDI reform measures announced by the government. On Friday, however, a much bigger event, the referendum on Britain's membership of the European Union (EU), which resulted in its exit from the EU—Brexit—spooked the markets. The Sensex opened lower by 635 points and went down by 1,091 points before bottom fishing brought some stability as the experts commented. Even as the index recovered 486 points from the day's low, it still closed the day with a deep cut of 605 points or 2.24%. The debt market did not react much on Brexit which otherwise showed a negative vibe towards Rexit. The currency market took a beating and the rupee lost on both Monday and Friday and ended the week with a loss of 89 paisa against the US dollar. The immediate impact of Brexit is an increase in risk aversion when it comes to investing. Michael Strobaek, Global Chief Investment Officer of Credit Suisse says, "Risk aversion is likely to take hold across asset classes". The first hint of this was seen on Friday when crude oil fell while gold rallied 5% each. Among the global currencies, only the Japanese yen and the US dollar appreciated which are considered as safe currencies by the market. Report says that currency depreciation will further increase risk aversion and put more pressure on the weak Asian currencies. Despite obvious regional effects, the European stock markets are highly integrated. Investors have the option of shifting between markets easily and many companies have strong cross-border ties, which both result in a steady co-movement of stock prices within Europe, at least for the larger companies. The co-movement between the UK and the rest of the EU has always been a little weaker than between other member states, this is a result of differences in industrial structure. In this context, a review of literature has been attempted in the following section to throw some light on the research works that has been conducted so far with regard to impact on economy in India and abroad in response to Brexit. *Section 3* highlights the objectives of the study while *Section 4* draws the methodology adopted to attain the objectives. *Section 5* is devoted to analysis and findings and finally *Section 6* sketches the concluding observations.

2. Literature Review

As per the reports, the impact of Brexit through the trade and investment channels would be most severe in the UK. Regulatory divergence would increase over time, affecting trade volumes and reducing the attractiveness of the UK for investment. *Wright (2016)* in the New Financial prepared a report with 25 responses from different market participants across Europe and different sectors of the capital markets to a detailed questionnaire. Most of the respondents were of the opinion that a vote to leave the EU could cause an initial period of significant dislocation and uncertainty in markets and across the industry, leading to lower activity and less cross-border investment. The UK could miss out on the potential benefits of the capital markets union (CMU) project. Respondents also said CMU marked an important shift in mindset by European policymakers in recognising the need for deeper capital markets in Europe - and that capital markets could be part of the solution. But they warned that in the event of Brexit it would either grind to a halt or become a more inward-looking project for the rest of the EU excluding the UK. It was felt that there is a high level of interdependence between capital markets in the UK and the rest of the EU. The UK has much deeper capital markets than the rest

of the EU, and plays a bigger part in overall levels of activity. On average, UK capital markets are nearly twice as developed relative to GDP as the rest of the EU, and the UK nearly accounts for between 25% and 75% of activity in most sectors of EU capital markets despite having only 14% of EU GDP. While the UK's markets are often viewed with suspicion by other countries, the UK's expertise in capital markets means it has a valuable role to play in shaping the capital markets union project to help boost growth across the EU.

FICCI (2016) in India conducted a quick survey to gauge the sentiment among the Indian companies having operations in or doing business with the UK. Some of the companies surveyed share deep trade and investment linkages with the UK. Responses were received from about 45 companies covering sectors such as education, information technology, tyres, pharmaceuticals, steel and steel products, automotive, textiles, apparel, financial services etc. As per the responses, UK's decision to leave EU is expected to impact the confidence level of the business and the investor community and there might be a temporary arrest in outbound investments from India to the UK until more clarity is obtained on the working framework between the EU and UK. On the other hand, *Dun and Bradstreet (2016)* opined that the aggregate impact of the UK's Brexit decision is expected to be minimal for the Indian economy. A good monsoon and recovery in local demand would negate some of the negative impact and support economic growth. There could be some slowdown in investment activity from foreign investors in the short term, but the strength of India's macroeconomic fundamentals would compel investors to return to India's shores in the medium to long term. *Raddant (2016)* reviewed the response of the European stock markets to the Brexit referendum. They found that while the impact of the vote was very similar for the stock markets in France, Germany and Spain, in Italy volatility among financial stocks intensified permanently.

Likewise, several organizations conducted different surveys but as yet no work in order to assess the impact or changes in the market indices in India and abroad are found. Thus, this paper aims at fulfilling this vacuum.

3. Objectives

- *To analyse the changes in trend of stock market indices before and after Britain's exit from the European Union.*
- *To assess the correlation between the changes in different indices in India and abroad prior to Brexit.*
- *To assess the correlation between the changes in different indices in India and abroad in response to Brexit.*
- *To predict how far the different stock market indices in India and abroad reflect change with change in Euro Stoxx50 both prior to and after the Brexit.*
- *To analyse the predictors of the European stock market (i.e. Euro Stoxx50) from the regression analysis of different stock market indices during both the phases.*

4. Methodology

4.1 Period of Study

The study is conducted over the period from 1st June, 2015 to 15th August, 2016. Based on the decision date of Britain's exit from the European Union, the entire study period is divided into two- from 1st June 2015 till 20th June 2016 is considered as the *Pre-Brexit period* and from 21st June 2016 till 15th

August 2016 is considered as the *Post-Brexit period*.

4.2 Data Type and Data Source

Secondary data is used for the purpose of study. Weekly closing data of the stock market indices of India and abroad namely, Nifty50, S&P BSE Sensex, Dow Jones, Euro Stoxx50, FTSE 100 and S&P 500 are collected from their official website. Then, Lognormal Return [ln (P_1 / P_0) where P_1 is current week's price and P_0 is immediately preceding week's price] (in order to take the compounding effect into consideration) is calculated from the weekly closing indices.

4.3 Tools Used

To analyse the data statistical tools like correlation and regression analysis are used. MS-Excel and SPSS software are used for carrying out calculations and plotting graphs.

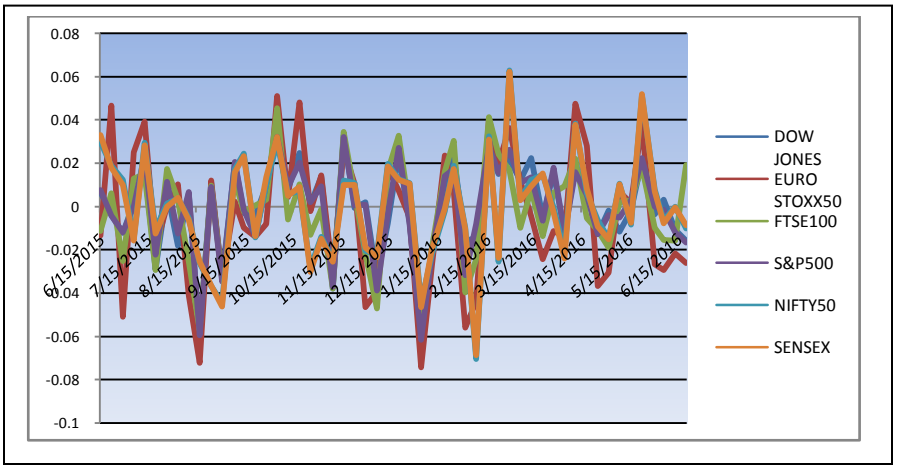
5. Analysis and Findings

The findings of the empirical analysis during the different phases are presented below.

5.1 Pre-Brexit Period

Figure 1 shows the fluctuations in the different stock market indices in India and abroad on a weekly basis 1year prior to Britain's decision of coming out of the European Union. It shows that from the beginning of June 2016 all the market indices started showing a declining trend which may be due to the news surrounding the market regarding Brexit and investors' safeguarding behavior of shielding themselves from any unforeseen losses due to the same, although FTSE100 showed a bit of a different behavior during the same period of 1 week before Brexit.

Chart Showing the Trend of Major Stock Market Indices from 1st June 2015 - 20th June 2016



Data Source: www.in.investing.com, www.bseindia.com, www.nseindia.com

Table: 1
Table Showing the Correlation between the Different Stock Market Indices during 1st June 2015 -20th June 2016
Correlations

		DOW JONES	EURO STOXX50	FTSE100	S&P500	NIFTY50	SENSEX
DOW JONES	Pearson Correlation	1	.742(**)	.820(**)	.979(**)	.597(**)	.602(**)
	Sig. (2-tailed)		.000	.000	.000	.000	.000
	N	54	54	54	54	54	54
EURO STOXX50	Pearson Correlation	.742(**)	1	.828(**)	.769(**)	.612(**)	.619(**)
	Sig. (2-tailed)	.000		.000	.000	.000	.000
	N	54	54	54	54	54	54
FTSE100	Pearson Correlation	.820(**)	.828(**)	1	.841(**)	.578(**)	.581(**)
	Sig. (2-tailed)	.000	.000		.000	.000	.000
	N	54	54	54	54	54	54
S&P500	Pearson Correlation	.979(**)	.769(**)	.841(**)	1	.611(**)	.617(**)
	Sig. (2-tailed)	.000	.000	.000		.000	.000
	N	54	54	54	54	54	54
NIFTY50	Pearson Correlation	.597(**)	.612(**)	.578(**)	.611(**)	1	.998(**)
	Sig. (2-tailed)	.000	.000	.000	.000		.000
	N	54	54	54	54	54	54
SENSEX	Pearson Correlation	.602(**)	.619(**)	.581(**)	.617(**)	.998(**)	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	
	N	54	54	54	54	54	54

*** Correlation is significant at the 0.01 level (2-tailed).*

Table 1 shows the correlation between the different stock market indices in India and abroad. It shows that Nifty and Sensex have a lower degree of correlation with the other market indices especially FTSE100 in comparison to the relation among other market indices amongst themselves. The correlation of Nifty and Sensex to that of EuroStoxx50 Index (which represents the performance of the 50 largest companies

among the 19 supersectors in terms of free-float market cap in 11 Eurozone countries) and S&P500 is considerably lower than the relation of EuroStoxx50 to other market indices during this period. EuroStoxx50 has the highest degree of correlation with FTSE100 followed by S&P500 and Dow Jones during the pre-Brexit period. Hence it may be said that the Indian stock market does not always reflect the picture of the stock market of US and Europe.

Table: 2
Regression Analysis of Stock Market Return with EuroStoxx50 as Dependent Variable and 5 Stock Market Indices as Independent Variables (1st June 2015 -20th June 2016)
Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					Sig. F Change	R Square Change	F Change	df1	df2	
1	.853 (a)	0.727	0.699	0.01721	0.727	25.626	5	48	0.000	1.937
a. Predictors: (Constant), SENSEX, FTSE100, DOW JONES, S&P500, NIFTY50										
b. Dependent Variable: EURO STOXX50										

Table 2 provides the information of the regression model and the explained ability. An R^2 of 0.727 indicates that the model explains almost all the variability of the response data around its mean. Durbin watson value of 1.937 shows positive serial correlation between the EuroStoxx50 and the other market indices during this period.

Table 3 shows Dow Jones and Nifty50 have a negative coefficient and may be interpreted as the reverse earners to EuroStoxx50. Since a t –value below -2 and above +2 are supposed to be good predictors, here it is found that FTSE100 is a good predictor of market return for the EuroStoxx50 during the Pre-Brexit period.

Table: 3
Coefficient of Regression Analysis of Stock Market Return with EuroStoxx50 as Dependent Variable and 5 Stock Market Indices as Independent Variables (1st June 2015 -20th June 2016)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta	B	Std. Error
1	(Constant)	-.002	.002		-1.007	.319
	DOW JONES	-.305	.560	-.203	-.544	.589
	FTSE100	.785	.191	.581	4.119	.000

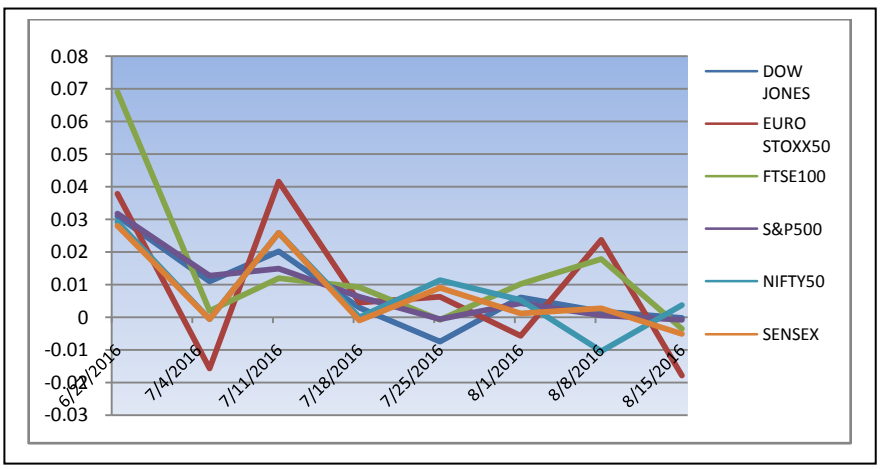
	S&P500	.547	.597	.365	.916	.364
	NIFTY50	-1.219	1.516	-.944	-.804	.425
	SENSEX	1.441	1.517	1.120	.950	.347

a Dependent Variable: EURO STOXX50

5.2 Post-Brexit Period

Figure 2 shows the trend in the market indices during the period when Brexit is announced and later. It shows that till the end of June 2016 all the market indices showed a declining trend but it started to recover again from July 2016 onwards. Both the domestic indices i.e. Nifty50 and Sensex and other market indices remained more or less stable showing a gradual uptrend while Sensex started picking up at a greater speed after first week of July 2016.

Figure: 2
Chart Showing the Trend of Major Stock Market Indices from 21st June 2016 - 15thAugust 2016



Data Source: www.in.investing.com, www.bseindia.com, www.nseindia.com

Table 4 below shows the correlation between the different stock market indices in India and abroad during the Post-Brexit period. It is evident from the analysis that the correlation between both the domestic indices Nifty and Sensex with the other market indices has improved, especially Sensex to EuroStoxx50, unlike the Pre-Brexit period. This may due to the herd instinct of the investors who reacted in the same manner irrespective of the geographical boundaries to the happenings in the market.

Table: 4
Table Showing the Correlation between the Different Stock Market Indices during 21st June 2016 -15th August 2016
Correlations

		DOW JONES	EURO STOXX50	FTSE100	S&P500	NIFTY50	SENSEX
DOW JONES	Pearson Correlation	1	.611	.794(*)	.957(**)	.706	.767(*)
	Sig. (2-tailed)		.107	.018	.000	.050	.026
	N	8	8	8	8	8	8
EURO STOXX50	Pearson Correlation	.611	1	.661	.565	.605	.879(**)
	Sig. (2-tailed)	.107		.074	.145	.112	.004
	N	8	8	8	8	8	8
FTSE100	Pearson Correlation	.794(*)	.661	1	.842(**)	.562	.697
	Sig. (2-tailed)	.018	.074		.009	.147	.055
	N	8	8	8	8	8	8
S&P500	Pearson Correlation	.957(**)	.565	.842(**)	1	.721(*)	.763(*)
	Sig. (2-tailed)	.000	.145	.009		.043	.028
	N	8	8	8	8	8	8
NIFTY50	Pearson Correlation	.706	.605	.562	.721(*)	1	.887(**)
	Sig. (2-tailed)	.050	.112	.147	.043		.003
	N	8	8	8	8	8	8
SENSEX	Pearson Correlation	.767(*)	.879(**)	.697	.763(*)	.887(**)	1
	Sig. (2-tailed)	.026	.004	.055	.028	.003	
	N	8	8	8	8	8	8

** Correlation is significant at the 0.05 level (2-tailed).*
*** Correlation is significant at the 0.01 level (2-tailed).*

Table: 5
Regression Analysis of Stock Market Return with EuroStoxx50 as Dependent Variable and 5 Stock Market Indices as Independent Variables (21st June 2016 - 15th August 2016)

Model Summary										
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					Sig. F Change	R Square Change	F Change	df1	df2	
1	.974(a)	0.949	0.821	0.009713	0.949	7.418	5	2	0.123	1.942
a. Predictors: (Constant), SENSEX, FTSE100, DOW JONES, NIFTY50, S&P500										
b. Dependent Variable: EURO STOXX50										

Table: 6
Coefficient of Regression Analysis of Stock Market Return with EuroStoxx50 as Dependent Variable and 5 Stock Market Indices as Independent Variables (21st June 2016 -15th August 2016)
Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta	B	Std. Error
1	(Constant)	.001	.005		.189	.868
	DOW JONES	.612	1.072	.329	.571	.625
	FTSE100	.255	.323	.258	.789	.513
	S&P500	-1.391	1.376	-.669	-1.011	.419
	NIFTY50	-1.104	.647	-.653	-1.708	.230
	SENSEX	2.781	.761	1.536	3.656	.067

a Dependent Variable: EURO STOXX50

Table 5 shows the information of the regression model and the explained ability during the post-Brexit phase. An R^2 of 0.949 indicates that the regression line perfectly fits the data and coefficients of the independent variable in the regression equation can be considered for further analysis. Durbin watson value of 1.942 shows positive serial correlation between EuroStoxx50 and the other market indices during this period. *Table 6* provides the coefficients of the each market indices return and their significance of impact upon the market return of other indices. It is observed during this phase that S&P500 and Nifty50 have a negative coefficient and may be considered as reverse earners to the returns of EuroStoxx50. The t-value shows only Sensex is the good predictor of European stock market.

6. Conclusion

The study basically aimed at providing an idea about the relation between the

different stock market indices and how far the news of Brexit affected the investment behaviour of individuals which further got reflected through the index fluctuations. It also attempted to find out that which market index in India or abroad is the predictor of the European market i.e.EuroStoxx50. It is seen from the correlation analysis that although during the pre-Brexit period the domestic indices i.e. Nifty and Sensex were not much correlated with the other indices and even with the European market but the happening of Brexit somehow brought the entire world together and the domestic market indices, especially Sensex became more positively correlated to EuroStoxx50 unlike the pre-Brexit period. From the regression analysis of stock market return with EuroStoxx50 as dependent variable and 5 stock market indices as independent variables during the pre-Brexit period, it is found that Dow Jones and Nifty50 are reverse earners to European market index while rest of the indices are found to be good predictors of European market especially FTSE100. During the post-Brexit period it is observed that S&P500 and Nifty50 are reverse earners to European index while among the other indices Sensex is found to be the best predictor of European market index. Hence this may be concluded from the analysis that Indian stock markets (i.e. Sensex) also got affected due to the Brexit and thus investors in India may consider this as an indicator to manage their portfolio at the time of any major happening in the economy even if it takes place in a far off continent. But at the same time Nifty50 being a reverse earner to European market index during both the periods, indicate that the investors investing with the said index may be able to avoid the negative impact of European markets in India while the investors investing with Sensex should remain cautious and engage actively in managing their portfolio from time to time.

Thus the present study has quite significantly highlighted the relation between different stock markets in India and abroad during the Pre Brexit and Post Brexit periods, though it has failed to consider the exchange rate factor in calculation of returns. Hence further studies may be carried out in the same line considering other factors like the exchange rate fluctuations, etc. using different statistical tools for analysis.

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BUSINESS START UPS AND ALTERNATE ROUTES OF INVESTMENT: NEW PARADIGMS OF ENTREPRENEURIAL FINANCING IN INDIA

Manoj Pillai

Abstract:

The report on the Committee on Angel Investment and early stage Venture Capital constituted by the Planning Commission (Now NITI Ayog) highlights that India needs to create 1 - 1.5 Crore (10 - 15 million) jobs per year for the next decade to provide gainful employment to its young population. Accelerating entrepreneurship and business creation is crucial for such large scale employment generation. The heightened interest rates in the startups during the interest boom years resulted in the need for startup funding. The most notable feature of the traditional financing agencies, which to a large extent resulted in the growth of Private Equity and Angel Investments in India, is that the banks, Development Financial Institutions and even the Stock Markets gave specific funding priority to large and well-known companies. The Private Equity firms and Angel Investors visualized this as an opportunity and a potential area of investment though risky to a large extent. The concept of Private Equity and Angel Investments are the latest and most dynamic financial instruments which have grown significantly even though its genesis in India is of recent origin. This article delves into all the relevant aspects of Private Equity Investment and Angel Financing in India.

Key Words:

Alternate Investment Funds, High Networth Individuals, Private Equity and Angel Funds, General Partners and Limited Partners

Introduction

The role of entrepreneurship in the economic development involves more than just increasing percapita output and income. It also involves initiating and constituting change in the structure of business and society. The change is accompanied by growth and increased output. An important theory of economic growth depicts innovation as the key not only in developing new products and services for the markets but also in stimulating investment interest in the new ventures being created. The new investment works on both the demand and supply sides of the growth equation. The new capital created expands the capacity for growth (supply side) and the resultant new spending utilizes the new capacity and output.

Innovation is a pivotal function of entrepreneurial process. Drucker (2005) describes innovation as the most specific function of an entrepreneur who creates new wealth producing resources or endows existing resources with enhanced potential for creating wealth. Movell and Higgins (1990) terms innovation as a process by which an entrepreneur convert opportunities into marketable ideas. By doing so, they become the catalysts for change. The creativity element is an important component in the innovative process.Matherly and Goldsmith (1985) opines that creativity is the generation of ideas that result in the improved efficiency or effectiveness.

Business Start Ups: New Paradigm of Entrepreneurship Development

The economic survey 2014-2015 highlights that India has emerged as the world's fourth largest hub for start ups and there are around 3100 of them, driven by the "hyper growth" concept. Chandrasekaran, R (2015) observes that India has the fourth largest eco – system for starts ups and going by the present trend, India will be ranked second after the United States of America. Keeping in tune to these developments, the Union Budget for 2015-2016 provides Rs.1000 crores for the promotion of starts ups and entrepreneurs. This fund is specifically aimed at supporting entrepreneurial ventures which experiment in cutting edge technologies which create value out of innovation ideas.

The Government's plan is known as Self Employment and Talent Utilization (SETU).This initiative will be a techno financial incubation facilitation programme which specially supports the main components of the Start Up business and other self-employment activities mainly relating to technology driven areas.Union Budget 2016 – 2017 increased tax relief period from 3-7 years. Since most of the startups take time to make profit, it will provide an impetus to the growth of startups. On analyzing the various constructs of current state of Indian startup, it was found that India is emerging as one of the top nation in the world as far as startup hubs are concerned. The average age of startup founder is 28 years which is a relatively young age, considering the global trends. Approximately 60 percent of the new jobs were created in the Small and Medium Enterprises in the last decade. The average number of new technical startups has moved from 480 in 2010 to 800 in 2015. It is expected to increase to 2000 in 2020. A striking feature of startup initiatives in India is that 9 percent of the total startup founders are women and there is approximately 50 percent growth in the share of female entrepreneurs in the last two years.

Policy Initiatives of Government of India

The Government of India has taken a number of policy initiatives to ensure that the startup business initiatives in India get adequate support. The key initiatives of the Government to strengthen the startup environment in India include the following:

1. **Make in India** – The Make in India initiative was introduced in September 2014 to promote the manufacturing sector by promoting companies to invest in this sector. The core objective of this initiative is to attract foreign investment and encourage domestic companies to participate in the manufacturing sector of the Indian economy.

2. **Start Up India** – The Startup India mission was initiated by the Government of India on 15th August 2015 to promote bank financing for startups and offer incentive to boost entrepreneurship and job creation. The main features of the action plan under the startup India mission includes the following:

   i) Funding support through a corpus of Rs. 10,000 crore.
   ii) Starting business in one day with highly supportive and flexible Government support mechanism.
   iii) No tax on profit, inspection for three years (Increased to seven years in Union Budget 2016 - 2017)
   iv) Capital gains exemptions
   v) Credits guarantee system.
   vi) Self-certification based compliance for labour and environmental laws.
   vii) Special schemes for women entrepreneurs
   viii) Encouragement to Women Entrepreneurs
   ix) Building of innovation centres at National Institutes
   x) Setting up of research parks.

3. **Stand up India** – This programme was announced in August 2015 along with the Startup India initiative and it aims to assist the startups with adequate banking finance and encourage entrepreneurship among the young Indians. On January 2016, Union Cabinet gave approval to Standup India campaign which aimed at promoting entrepreneurship among women and scheduled castes and tribes. Some of the main elements of Standup India initiative include the following:

   i. Loans for greenfield projects in the non-farm sector
   ii. Facilitation of at least two such projects per bank branch.
   iii. This scheme is expected to benefit at least 250,000 borrowers in three years from the launch of the scheme.

4. **Digital India** – The Digital India Mission of the Government of India is to ensure that the Government services are made available to every citizen through the online platform. It also aims to connect the rural areas by developing their digital infrastructure. Many E-Commerce companies in India are planning to penetrate into the rural market as part of the Government's Digital India initiative. The vision of digital India is centered on the following three key areas:

(a) Digital Infrastructure as a utility to every citizen - The core component included in this segment includes access to high speed internet, easy access to common service centers, sharable private space on a public cloud and a safe and secure cyber space.

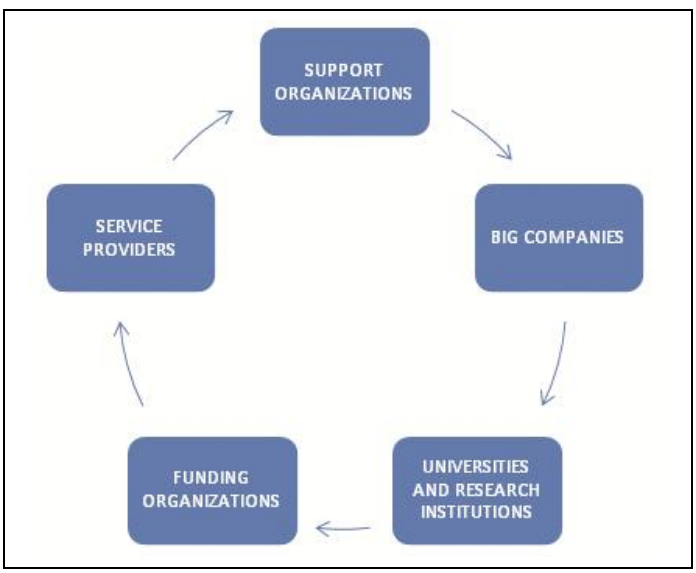
(b) Governance and Service on Demand - The main emphasis under this segment includes availability of services in real time from online and mobile platform, making financial transactions electronic and cashless and availability of all citizen entitlements on the cloud.

(c) Digital Empowerment - Its focus is on universal digital literacy, universal access to digital resources and services in Indian language and collaborative digital platforms for participative governance.

5. **Startup Exchange** – The Securities and Exchange Board of India introduced a new set of listing norms for startups, including e- Commerce ventures, planning to generate funding from listing on stock exchanges. The new norms will provide relaxations in disclosure related requirements, takeover and Alternate Investment Fund regulations for Information Technology, data analytics, intellectual property, bio –technology or Nano – technology companies.

Start Up Ecosystem in India: An Overview

A startup Ecosystem consists of entrepreneurs, financial support components and non-financial support systems like incubation centres, acceleration support, mentoring and technical experts. Government support systems and policies, Academia and Research centres, and other related institutions and organizations which interact with the support startups. Figure 1 below highlights the vital components of the Startup Ecosystem in India.



Startup Financing - the Alternate Investment Route through Private Equity Investment and Angel Finance Investment

Finance is an important component that directly influences the growth and development of a business venture. The wind of change that redefined and altered the global business environment has touched the financial sector too. New and innovative financial concepts have been introduced and developed, which along with the traditional sources of finance have resulted in the creation of diverse options of entrepreneurial finance. If one analyses the flow of entrepreneurial or venture capital, it can be easily inferred that Scheduled Commercial Banks, Development Financial Institutions (DFI's) and Capital Markets were the three main sources of entrepreneurial capital. Ramnath Renuka (2006) writes that the heightened rates in the startups during the interest boom years resulted in the need for startup funding. The alternative financial investments can be related to different categories of investors depending on risk profile, stage of funding and size of investments. The Private Equity investments are directed towards well established business with a proven track record. They commit huge volume of funds for expansion and growth. Similarly, they undertake calculated well defined risks with reasonably good view of exit strategy. Angel Investments are linked to the high Networth individuals who have been successful entrepreneurs. They are driven by the entrepreneurial spirit, as they take significant risks to invest in new ideas which have not been proven yet. The most notable feature of the traditional financing agencies, which to a large extent resulted in the growth of Private Equity and Angel Investments in India, is that the Banks, Development Financial Institutions and even the Stock Markets gave specific funding priority to large and well-known companies. The Private Equity firms and Angel Investors visualized this as an opportunity and a potential area of investment though risky to a large extent. The concept of Private Equity and Angel Investments are the latest and most dynamic financial instruments which have grown significantly even though its genesis in India is of recent origin. Table 1 below highlights the fundamental differences between Private Equity Investment and Angel Investment.

Table 1: Points of distinction between Private Equity and Angel Investment

Points of Distinction	*Private Equity Finance*	*Business Angels*
Personal	*Entrepreneurs*	*Entrepreneurs*
Firms Funded	*Large, Mature Stage*	*Small, Early Stage*
Due Diligence done	*Extensive*	*Minimal*
Location of Investment	*Not Important*	*Of Concern*
Contact Used	*Comprehensive*	*Simple*
Post Investment Engagement	*Strategic*	*Active, Hands - On*
Exit	*Highly Important*	*Of Lesser Concern*
Rate of Return	*Highly Important*	*Of Lesser Concern*

Private Equity Investment - The Indian Scenario

Private Equity is referred to those entities which funds capital to take long term risk, for developing ideas and business ventures run by sound management which has all the ingredients of becoming market leaders. The Private Equity is managed by efficient fund managers and advisors who basically aim at gainful participation in the growth of these companies. Private Equity firms provide wealth and experience across borders and facilitate rapid scaling up of operations.

The Private Equity investment generally has a lock in time period of 5-7 years. Majority of the private equity firm adopt the 2:20 revenue sharing which means that the private equity firms are given 20 percent of the funds committed as yearly charges for managing activities and 20 percent of the gains made at the end of the specified term (Ahuja Anil 2007). It consists of investors and funds that make investment directly into private companies that result in a delisting of public equity. Capital for private equity is raised from retail and institutional investors who can commit large sums of money for long period of time. The private equity firms are generally organized as limited partnerships where the private equity firms serve as General Partners (GPs) and large institutional and High Networth Individuals (HNIs) providing bulk of the capital serve as Limited Partners (LPs).

The High Networth Individuals (HNIs) in India are categorized into the following three types:

1. *The Ultra High Networth Individuals (UHNIs): Those individuals who have an investible surplus of above Rs. 15 crores.*
2. *High Networth Individuals (HNIs): Those individuals who have an investible surplus up to Rs. 15 crores.*
3. *Mass Affluent: Those individuals who have an investible surplus of above Rs. 50 Lakhs and below 2.5 crores.*

Growth of Private Equity in India

The private equity made its presence in India about a decade back. Most of the Private Equity investments were small ones with specific orientations towards the mid-sized companies. Chandrasekhar (2007) writes that observers began to take note of private equity's growing presence in India during 2002 when Oak Hill Capital and Financial Technology ventures backed a management's bid to acquire Conseco's stake in Delhi – based EXL Services. The most striking contribution of private equity in the growth of an organization can be related to the deal between BhartiTeleventures and renowned Private equity investor WarbugPincus. Financial experts believe that the infusion of nearly $ 300 million by WarbugPincus along with a close involvement in the management resulted to the growth of the company. In the year 2005, 124 Private Equity deals were done in India worth $2 billion. Chaudhry Rohit (2007) observes that the private equity investment in India shot up by over 230 percent. In 2006 Private Equity fund investment was at $7.46 billion. A sector wise assessment reveals that the equity deals in 2006 was led by the technology sector with 87 deals amounting to $ 1.47 billion. Other industries that attracted private equity investment include manufacturing (19% of deal flow), health care (8%), banking and financial services

(10%). India focused private equity funds stood at around $ 3 billion during the first six months of the current financial year of 2007 – 2008. Private equity investments in India increased to 17,129 million dollars in 2007 from 938 million dollars in 2002.

The number of deals increased to over fivefold to 356 during the period 2002 to 2007. Similarly, while the value of deals increased more than 18 times during the same period, making it one of the fastest growing Private Equity markets of Asia. Indian private equity and venture capital deal value increased by 16 percent to reach $ 11.8 billion in 2013 over 2012. Similarly the deal volume grew at 26 percent over 2012. The total number of deals in year 2015 stood at 1049 having value of 23 billion dollars.

Number and Value of Deals

YEAR	*NUMBER OF DEALS*	*VALUE OF DEALS (BILLION $)*
2005	*185*	*2.6*
2006	*296*	*7.4*
2007	*494*	*17.1*
2008	*448*	*14.1*
2009	*216*	*4.5*
2010	*380*	*9.5*
2011	*531*	*14.8*
2012	*551*	*10.2*
2013	*696*	*11.8*
2014	*801*	*15.2*
2015	*1049*	*23*

Source: India Private Equity Report 2016 (Bain & Company)

The above table highlights that the total number of deals increased to 795 in 2014 from 185 in 2005. Similarly the value of these deals increased from 2.6 billion dollars in 2005 to 15.2 billion dollars in 2014.

Table: 2 Sectoral Break Ups of Deals

Table 2 given below throws light on the sectoral break ups of the various sectors of Indian economy which has received Private Equity Investment. The table also highlights deal values, Compound Annual Growth Rate (CAGR) between the years 2012 to 2015 and the key drivers of the deal growth. The Private Investment has reached to almost all the important sectors of Indian Economy like Consumer Technology, Banking Financial Services and Insurance, Real Estate, Information Technology and Information Technology Enabled Services (IT/ITES), Energy, Consumer and Retail, Telecommunications etc. Telecommunications recorded the highest CAGR growth of 279 percent between the period 2012 and 2015, followed by Banking Financial Service and Insurance, Energy and Real Estate.

Table 2: Sectoral Allocation of Private Equity Investment.

SECTOR	DEAL VALUE ($ Billion)					KEY DRIVERS OF DEAL GROWTH
	CY 12	CY 13	CY 14	CY 15	CAGR (12 - 15)	
Consumer Technology	1.0	1.2	4.7	6.9	89%	• Increasing Internet and Smartphone penetration • Availability of capital fostering entrepreneurship
Banking, Financial Service & Insurance	0.9	1.2	1.9	4.0	65%	• Significant under penetration in financial products, Government Initiative
Real Estate	1.8	1.4	2.2	3.9	29%	• Moderation in Real Estate Prices • Easing of regulatory Environment
Health Care	1.2	1.4	1.2	1.3	12%	• Increased secondary deal flow in healthcare delivery
IT & ITES	1.4	1.4	1.2	1.3	- 4%	* Key Driver of GDP Growth in India, continues to maintain growth momentum * Increased flow of secondary capital
Energy	0.4	0.8	1.0	1.1	37%	• Increasing focus on renewable
Consumer & Retail	0.8	1.0	1.3	1.1	11%	• Increasing disposable income and traction in organized retail
Manufacturing	0.5	1.3	0.5	0.8	16%	• N/A
Engineering and Construction	0.4	0.3	0.6	0.7	19%	• Increased Infrastructure and Industrial Investments
Telecommunications	0.0	1.3	0.1	0.5	279%	• Continued evolution from 3G to 4G network in a scale market
Shipping & Logistics	1.5	0.2	0.4	0.4	-7%	* N/A
Media & Entertainment	0.3	0.4	0.4	0.2	-8%	* Wave of digitalization
Others	0.8	0.0	0.0	0.2	-33%	* N/A
Total	10.2	11.8	15.2	22.9	31%	

There has been a Compound Annual Growth Rate of 31 percent in the total sectoral Private Equity Investments in all the sectors during the period 2012 to 2015.

Angel Investments

Angel investment is an innovative investment mechanism which has emerged as an important source of capital for new entrepreneurs and start up ventures. The Angel Investors are mainly the High Net worth Individuals (HNIs) who provide financial support in the form of capital with an expectation of a high return similar to Venture Capital and Private Equity. The angel investor provides management support and business network links to the firms. Angel investment has certain distinct features when compared to venture capital and private equity. Angel investment is done in new ideas which have not been proven yet whereas Private Equity investment is undertaken at the early stage companies. Similarly the angel investor invests their own capital which is unlike the investment made by Private Equity firms which invest in business ventures from a pooled source invested by various investors. The Angel Investor have no fiduciary responsibilities towards any one as the entire invested money is their own where are the Private Equity firm have fiduciary responsibility towards the investors. Similarly the volume of funds invested by angel investors is less as compared to Private Equity firms.

The angel investments are always at the initial stage in the startup stage of a business venture where as the Private Equity funds are available for different stages. The private equity has been specially designed for investment in the latter stages of the venture. The funding process of an angel investment begins when an entrepreneur gets in touch with the angel investor. The funding procedure is more or less similar to the Venture Capital and Private Equity forms of financing. The screening of the proposals is the initial process which is done by the network agency. The network agency presents the proposal to the prospective angel investor for assessment. Based on the strengths and merits of the proposals and the background of the entrepreneur, the angel performs a due diligence on the investment pattern. The angels give top level priority to investment in the initial stages of the business. They also closely monitor the operations of the business venture.

Progress Report of Angel Investment In India

There has been an upward trend in the angel investment activity in India. Table 3, given below, highlights that there is a steady increase in the number of companies receiving Angel investments during the last one decade.

Table 3 - Volume of Angel Investments

YEAR	*NUMBER OF COMPANIES*
Before 2006	*17*
2006	*19*
2007	*12*
2008	*18*
2009	*25*

2010	22
2011	39
2012	33
2013	32
2014	47
2015	47
2016	69

Source: InnoVen Capital: India Angel Report 2016

The city wise distribution of Angel investments shows that the metropolitan cities of India have received the bulk of the angel funding. Table 4 gives the percentage share of deals in the six major metropolitan cities of India.

City	FY 12 (%)	FY13 (%)	FY14 (%)	FY15 (%)	FY16 (%)
Mumbai	37	32	37	24	10
NCR	4	24	8	16	36
Chennai	22	4	21	18	5
Bengaluru	26	20	21	29	20
Hyderabad	3	-	2	7	9
Others	8	20	11	6	21

Table 5 throws light on the sectoral distribution of the Angel Investments in India. Angel Investors have invested in all the major sectors of Indian economy with Consumer Internet and Mobile leading in the deals followed by IT/ITES, Food Processing, Logistics and a host of other sectoral investments.

Table – 5 Sectoral Distributions of Angel Investments

Sector	Investment (Rs. MM)
Consumer Internet and Mobile	211.6
IT/ITES	194.7
Food Processing	149.2
E- Commerce	116.5
Logistics	100.7
Marketing & Advertising	62.5
Healthcare and Lifesciences	54.5
Consumer Services	42.1
Education	31.5
Financial Services	29.8
Social Network	24.9
Others	116.2

Source: Indian Venture Capital and Private Equity Report, 2016

Funding Process of Angel Investmentes

The funding process of an Angel Investment begins when an entrepreneur gets in touch with an Angel Investor. The funding procedure is more or less similar to the Venture Capital and Private Equity forms of financing. The screening of the proposals is the initial process which is done by the network agency. The network agency presents the proposal to the prospective Angel Investor for assessment. Based on the strengths and merits of the proposal and the background of the entrepreneur, the Angel performs a due diligence on the investment pattern. The angels give top level priority to investment in the initial stages of the business. They also closely monitor the operations of the business venture. The exit procedures adopted by the angels are similar to that of the Venture Capital and Private Equity Investors.

Exit Routes

The private equity exit can be through Buyback, Initial Public Offers, Mergers & Acquisitions (Strategic Sales), Open Market Sales and Secondary Sales. Buyback takes place when the entrepreneur pays back the entire private equity finance as per the agreement. The private equity finance can exit through the issue of shares in the stock market (Initial Public Offer) and repay the private equity debt as per the agreement. Strategic sales approach is also used as an exit route. In this method, the private equity firm strategically sells its stake in a company to another private equity firm The Merger and Acquisition is the most common form of Strategic Sales. Open Market Sales method can also be used as an exit route in which the private equity firm sells its stake in a particular firm in the open and any interested party. Figure 6 highlights the largest exits of the Private Equity firms during the period from 2012 to 2015. The throws light on the different sectors of the economy where exits have taken place and also the exit values along with the Compound Annual Growth Rates of the exits. The notable feature of table 6 is that there is a high degree of similarity between the Private Equity investment pattern and Private Equity exit pattern. Exits have taken place in almost all the major sectors of the economy.

Table 6: Private Equity Exits during the period 2012 - 2015

SECTOR	*EXIT VALUE ($ Billion)*					*2015 LARGEST EXITS*
	CY 2012	*CY 2013*	*CY 2014*	*CY 2015*	*CAGR (2012 - 2015)*	
Banking Finance Services and Insurance	*2.1*	*1.0*	*0.7*	*2.3*	*2%*	• *$386M, TPG Capital exit from Shriram City Union Finance*
IT & ITES	*1.2*	*1.7*	*1.0*	*1.6*	*7%*	• *$1150 M, Apax Partners exit from iGate Corporation*
Healthcare	*0.3*	*0.9*	*0.5*	*1.0*	*41%*	• *$200M, Chryscapital exit from Mankind Pharma*

Manufacturing	*0.1*	*1.0*	*1.3*	*0.9*	*87%*	• *$300M, Baring Asia exit from Lafarge India*
Consumer Technology	*0.0*	*0.0*	*0.3*	*0.8*	*225%*	• *$450M, ru- Net, Sequoia, Tybourne, Valiant, Safina exit from Freecharge*
Telecommunications	*1.0*	*0.3*	*0.3*	*0.8*	*-9%*	• *$410M, India Value Fund exit from ACT Broadband*
Real Estate	*0.9*	*1.1*	*0.4*	*0.6*	*-11%*	• *$233M, IL&FS exit from QVC Realty*
Consumer & Retail	*0.2*	*0.2*	*0.3*	*0.5*	*30%*	• *$95M, GIC exit from Marico*
Energy	*0.0*	*0.0*	*0.3*	*0.4*	*122%*	• *$169M, IDFC exit from Green Infra*
Media & Entertainment	*0.0*	*0.1*	*0.3*	*0.3*	*1263%*	• *$77M, Apollo exit from Dish T.V.*
Engineering and Construction	*0.1*	*0.2*	*0.2*	*0.2*	*54%*	• *$100M, Genesis exit from Ambuja Cements*
Shipping & Logistics	*0.1*	*0.1*	*0.3*	*0.1*	*-21%*	* *$47M, New Silk Route exit from VRL Logistics*
Others	*0.1*	*0.4*	*0.2*	*0.1*	*-7%*	* *$46 M, Rabo equity exit from NCMS*
Total	*6.4*	*7.0*	*6.0*	*9.4*	*14%*	

Conclusion

The report on the Committee on Angel Investment and early stage Venture Capital constituted by the Planning Commission (Now NITI Ayog) highlights that India needs to create 1 – 1.5 Crore (10 – 15 million) jobs per year for the next decade to provide gainful employment to its young population. Accelerating entrepreneurship and business creation is crucial for such large scale employment generation. The report further mentions that India has the potential to build about 2500 highly scalable business in next 10 years – and given the probability of entrepreneurial success that means 10,000 stat ups will need to be spawned to get to 2500 large scale businesses. Entrepreneurial finance is an important component for entrepreneurial surge in an economy and ever since the economic reform numerous alternative forms of flexible capital can be seen in the Indian financial domain. Private Equity/Venture Capital Investments and Angel Financing are the two most promising new entrants in the Indian Financial System which has revolutionized entrepreneurial financing in India. The Indian Private Equity investment deal value including deal across sizes and sectors increased 28 percent to $ 15.2 billion in 2014, the highest in past 5 years. Deal activity is expected to surge, and general partners point to a strong macro-economic environment, changes in the exit

environment and evolving investor sentiment as the top drivers. With an increase in the number of deals over $ 100 million, the top 25 deals accounted for $ 6.4 billion of the capital deployed, constituting 49 percent of the total private deal activity in 2014. The general partners point out that a large number of Indian promoters now better understand the private equity funding concepts. Valuations, Sector expertise and brand are most important criteria for entrepreneurs who are looking for private equity funding. Angel financing too is gaining popularity and momentum in India financial arena. The percentage of angel and incubator participation in Indiastood at 16 percent in the year 2013, which is only second to Canada which witnessed a growth of 19 percent during the same period. Along with all the optimism and euphoria, there are certain skepticism too associated with the concept of private equity financing and Angel investments. Lack of proper norms of disclosures, and governance regulations are the weak links which has to be eliminated.

The Government should evolve liberal, transparent and effective regulatory and statutory norms so as to make the concept of private equity and Angel Investment more dynamic. As of now, Private Equity and Angel Investments in India is at its infancy stage. How these financial instruments adapts to the economic environment and how it faces the market challenges will decide the future direction of this new alternative source of flexible entrepreneurial finance and Investments.

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COBWEB THEOREM: SIGNALS FROM INDIAN COMMODITY MARKETS, WITH SPECIFIC REFERENCE TO PULSES

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RachappaShette

Abstract:

Pulse prices began to hit the headlines from May through September 2016 on account of the inflationary tendencies. An understanding of the Cobweb Model provides a better understanding of the reasons for the friction between supply and demand. The slew of measures taken by the policy-makers in the first good monsoon, after two monsoon-deficient years, have resulted in a turnaround in the pulse prices in India as seen between November 2016 and February 2017. This paves the way for a smoother interaction between the commodity spot and the commodity derivatives markets. The Cobweb Model is equally useful to producers, consumers, policy-makers and traders.

Key Words:

Commodity Market, Pulses, India

Background and Context

India is the second-most populated country with 1.25 billion, with a significant portion of its populace comprising of vegetarians. Being a developing economy, the predominant item of expenditure in most household budget consists of food-related items. From an economic as well as political angle, inflation is a sensitive subject. India's monetary and fiscal policy-makers are seized of this subject of inflation during policy-making exercises. In September 2015, the Reserve Bank of India, during its press

conferences at the time of a monetary policy announcement, has observed that vegetables and pulses are a major source of inflation impacting households. On the monetary side, high interest rates have been used as a tool to combat inflation- a feature detrimental to economic growth; on the fiscal side, subsidies have been used as a tool to alleviate inflation. Since 2015, the fiscal authorities have focused on the role of pulses in the food-inflation basket, with measures such as buffer stocking, imports, support prices for producers, and anti-hoarding measures. In this manner, the focus has rightly been to shift the burden of food-related inflation control from the monetary authorities to better management of the supply chain for pulses. Anecdotal evidence suggested that this policy has worked, with the pulse prices moving from a sellers' market in 2015 to a buyers' market in 2016, bringing food inflation under control. This transition constitutes the subject matter of closer scrutiny in this paper.

The prices of pulses in India (also onions and vegetables in Maharashtra and potatoes in West Bengal) are subject to swings back and forth from high (sellers' market) to low (buyers' market).In this paper, an attempt has been made to fit this phenomenon within the framework of the Cobweb Theorem (Kaldor, 1934), where prices of agri-commodities zig-zag from high to lowand back, before settling down to an 'equilibrium' price. However, this 'equilibrium' price is arrived at after going through a few production cycles. The main reason for this is, the consumers decide upon the price to immediately (at time t) whereas the producers decide to grow pulses based on realized prices in preceding crop cycle (time t-1). [There are other variants of the Cobweb Model, not discussed in this paper.] Interventions by the fiscal authorities are aimed at: providing incentives for adequate production of pulses, procurement for buffer stocks and price stabilization, curbing of imports and conservation of foreign exchange, with an overall objective of food-inflation control. From the perspective of the markets, buffeting against supply shocks and the consequent price shocks would pave the way for a more efficient price discovery process, both in the spot and commodity derivative prices. This would also sanitize the money markets against supply-chain related food inflation, resulting in better transmission of monetary policy measures.

During the inauguration of the new campus of NISM at Patalganga on December 24, 2016, Prime Minister Narendra Modi had suggested research activity that would help the community of farmers take advantage of activities in the commodity market space. The current study is a modest effort in this direction.

Literature Review

Kaldor (1934) coined the phrase 'Cobweb Theorem' to describe the phenomenon of price-determination in agricultural commodities. Consumers make spot estimates of prices whereas producers rely on backward-looking estimates in deciding the crop mix. Their products eventually hit the markets at the end of the crop-production cycle. In the case of a glut, consumers have the freedom to choose their supplier, causing prices to drop. However, in the case of a glut due to crop failure or a peaking of demand, consumers will bid higher in order to ascertain their purchase. This feedback loop impacts the crop mix of producers in deciding what to produce in their next production cycle. This creates a price spiral in a rectangular shape, either in a convergent or divergent manner.

Generally, when the elasticity of supply is greater than demand, the price series converges. This 'screw-shaped price spiral' has also been described by **Mordecai** (1938).The Cobweb Theorem has been confirmed in several studies in several geographies and products, reflecting its wide-ranging appeal. **Modigliani & Grunberg** (1951) observed that consumers and producers keep their inferences on price estimates private. **Walters** (1971) observed that market participants are extrapolators and do not believe their predictions to turn out to be always true. **Tamari** (1981) identified price movements in the housing sector in Israel with the Cobweb model. New immigrants caused a rise in the demand for housing, whereas the supply of labour was also augmented on account of the rise in the immigrant population. **Arifovic** (1994) recognized patterns along the lines of genetic algorithms, as the participants 'learnt' how the price mechanism of a commodity works. **Rosen**et al, (1994), based on observations in the cattle market, said that every 3-year cycle, participants had to unlearn and relearn the pricing mechanism process. **Lotterman** (2012) extended this observation from the cattle markets to the market for shipping and even careers.

Thus, the Cobweb model has a record of literature of its own, and straddles Game Theory of Von Neumann & Morgenstern and the Rational Expectations Theory of Robert Lucas. The plausible difference between the two is that under Game Theory, economic agents keep information private as they are relatively unsure of their predictions, in contrast to the Rational Expectations Theory, where predictions are communicated and get widely used in the markets. From a policy perspective, Keynesian theory necessitates fiscal intervention in the markets, whereas under the Friedman model, market forces alone should figure out the way forward, and the monetary authorities may provide or withdraw liquidity.

From a purely Indian perspective, this paper is a follow-up to the one on Agricultural Policy in India by Korivi& Chari (2016). While the Indian fiscal authorities have indeed taken a slew of measures to address major issues pertaining to fertilizers, soil-testing, irrigation and market mechanisms, inflation in the prices of pulses continued to be a major issue. With specific respect to pulses, the authors made the following observations, based on the period July 2013 to September 2015:

Pulses are cultivated mainly in the rain-dependent states of Madhya Pradesh, Maharashtra, Telangana, Andhra Pradesh and Karnataka. Unfortunately, these are the very states affected by drought conditions during 2015. India produced around 1.7 million tons of pulses during 2015, as against a demand of 2.1 million tons, the balance being met through imports. The major exporting countries are Myanmar, Australia and Canada. As the failure of the Indian monsoon became imminent in August 2015, hoarders and price manipulators began taking advantage of shortages. Prices of pulses began to spiral upwards, even as imports were resorted to. Some state governments initiated raids and imposed inventory-level restrictions on importers and traders, particularly as the festival season was on, during October-November 2015. Import consignments got stuck on the high seas, until inventory-level restrictions were relaxed for direct importers. As a result of the prevailing high prices of pulses in India, the acreage under cultivation increased for pulses, partly replacing cotton and rice, particularly in Gujarat. This is a good example of crop diversification guided by market forces. There is now a view that the

government needs to incentivize cultivation of pulses, a form of a Public Private Partnership (PPP) by bringing them under the Minimum Support Price (MSP) scheme and also maintain buffer stocks of pulses, to curb inflation. Excessive imports of pulses are also a drain on India's foreign currency resources. Chana is a commodity whose futures are traded on the National Commodity Derivative Exchange (NCDEX).It is hoped that other commodities futures too, among other pulses, will be traded on the exchanges, to provide price signals and aid price discovery, which will also guide the allocation of agricultural resources.

Subsequent to the publication of the above referred paper, the upward trend in pulse prices continued until November 2016, when rising kharif output and imported stocks began to hit the market, as described in the subsequent sections of this paper, providing hints to the existence of the Cobweb Theorem phenomenon.

Research Objective

The objective of this paper is to study closely the events from May 2016, which saw a turning point in the price pattern for pulses in India, with a view to gauge the causes for prices of pulses to spiral downward, as opposed to the upward spiral in the previous calendar years- 2014 and 2015. The experience across these three years could pave the way for creating market mechanisms for reducing the price volatility in pulses, added with a better understanding of the Cobweb Theorem. In this manner, the present study is in the direction suggested by the Prime Minister Modi, wherein the commodity market research serves the farming community.

Research Design

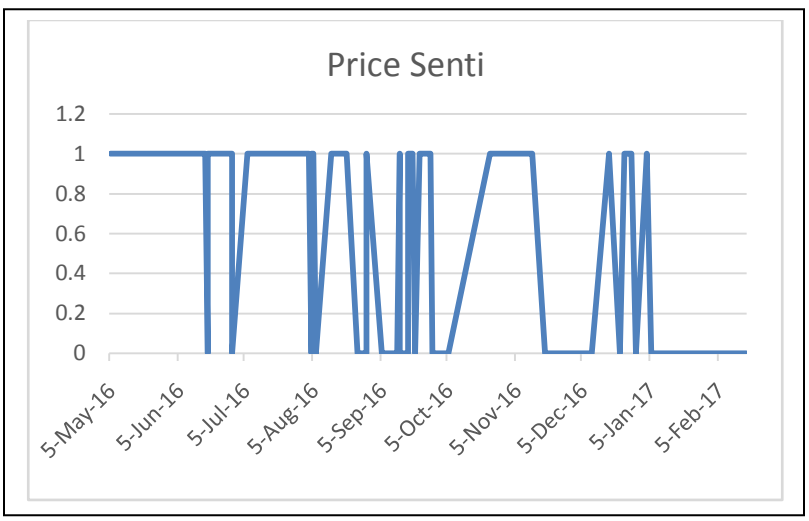
The section on Background and Context was based on anecdotal instances, whereas the subsequent sections are to be based on an event study across the period May 2016 through February 2017, a period of 10 months, based on 85 data points. Notably, the earlier paper by Korivi & Chari (2016) contained only 31 events in a 39-month period, whereas the 10-month period under the present study contained 85 events. This clearly highlighted the role of pulses in inflation, bringing the attention of the people, politicians, policy-makers as well as the press into the public discourse. The selection of the period May 2016 to February 2017 is significant as it marked the turning point in the trajectory of pulse prices in India. Thus, the Event Study Method covers 85 information events that touched the pulse market in India and impacted prices and moved them either higher or lower relative to the previous events, similar to the study by Tamari (1981, 2012).

In order to incorporate the Cobweb Model's characteristics into the study, using the Mitra & Mitra (2011) News Analytics Technique, the Price Sentiment was captured in the Binary Form: Digit 1 was marked against events that signaled high pulse prices (good for the producer) and Digit 0 against events that signaled low pulse prices (bad for the producer). After marking each of the 85 events in this manner, the Price Sentiment graph (Figure 1) is drawn up, to display the characteristics of the Cobweb phenomenon. Thereafter, the paper goes further into the granular details underlying the phenomenon with a view to provide inputs towards policy-making.

Analysis and Findings

The period under observation was May 2016 to February 2017.Notably, the price levels of pulses during the month of May 2016was high against the backdrop of two failed monsoons during 2014 and 2015, and the propensity of Indian farmers to grow cash crops like sugarcane and cotton despite water stress in the pulse growing regions of Madhya Pradesh, Maharashtra, Telangana, Andhra Pradesh and Karnataka. This set price expectations high during the initial period of this study. By contrast, around February 2017, actual price levels came down on account of the higher areas under pulse cultivation, good monsoon, imports by government agencies, government incentives for pulse growing through the MSP programme and anti-hoarding measures. Theoretically, going by the Cobweb Model, Price Sentiment should be 1 at the beginning of the study period and 0 towards the end of the study period. This is evidenced by the actual graph depicted in Figure 1 in respect of the 85 events studied.

Fig. 1: Time-Price Sentiment Graph



Graphically, Fig. 1 shows the transition from a steady "1" from May 5, 2016 to July 5, 2016 to a steady "0" from Jan. 5, 2017 to Feb. 17, 2017, indicating the completion of the turn in the Price Sentiment. In between, there are ups and downs, granular details of which are further discussed in the paragraph below.

From a Descriptive Statistics standpoint, with 85 event dates, the Median date based on (n+1)/2 = (85+1)/2 = 43rd day. Day number 43 in the series of events captured in this data set is August 5, 2016. Considering the first set of 43 observations, there are 39 events with Digit 1 and only 4 with Digit 0, (i.e. 39/4) indicating the complete domination of the positive Price Sentiment. In the second set of 43

observations, there are only 16 observations with Digit 1 and as many as 27 observations with Digit 0, (i.e. 16/27), indicating the dominance of the negative Price Sentiment. This proves the onset of the Cobweb phenomenon after the 43rd event date.

Sliced differently by bisecting the 10-month period into two 5-month halves, the number of observations with Digit 1 during May 2016 to September 2016 is 47, as against only 16 with Digit 0, (i.e. 47/16), indicating the dominance of the positive Price Sentiment. In the second half of the 10-month period from October 2016 to February 2017, the number if observations with Digit 1 is only 7, with 15 observations marked with Digit 0, (i.e. 7/15), indicating the dominance of the negative Price Sentiment. In this manner of slicing the event data too, it is proved that the Cobweb phenomenon has set in after October 2016, to create the turn in the Price Sentiment.

The intermediate blips from 1 to 0 and vice-versa reflect the real world. Since each producer keeps his own price forecasts private, there is no convergence of sentiment. For this reason, there is the presence of Digit 0 in the period dominated by Digit 1 observations, as also the present of Digit 1 in the period dominated by Digit 0 observations. This also seems to be intuitively true, or else the production and supply of certain commodities would completely disappear from the markets despite the presence of consumers willing to pay high prices, which is improbable.
Further granular analyses of the 85 events reveal 6 underlying phenomena. These are:

*1. **Minimum Support Price (MSP)** under the government's procurement programme (29 events)*

*2. **Good Monsoons** resulting in increased acreage under pulse cultivation (24 events)*

*3. **Imports** as a measure towards arresting inflation (13 events)*

*4. **Hoarding** and anti-hoarding measures by the central and state governments (13 events)*

*5. **Markets** for a fair price discovery mechanism (12 events)*

*6. **Pulses Cultivation in Substitution** of cotton and other crops (7 events).*

A detailed discussion follows.

MSP: India's agricultural production and procurement policies have been cereal-centric, since independence. This had led to skewed crop selection towards wheat and rice. In fact, cultivation of rice (paddy) involves consumption of vast quantities of water, compared to other crops. Added to this was the mismanagement of the grain storage facilities by the Food Corporation of India (FCI) through spoilages, rodents and pilferages. The paper by Korivi & Chari (2016) had provided hints from stakeholders towards coverage of pulses under the MSP programme, through incentives for the cultivation of pulses, creation of buffer stocks, stabilization of prices (buy when low, sell when high) and strategic reserves of inventory to combat inflation. These pleas seemed to have gained the attention of the policy-makers and pulses are now covered under the MSP procurement programme of the government.

On May 5, the centre provided 4 Indian states with 10,000 tonnes of pulses as prices began to skyrocket. On June 2, as an incentive for producers, the government announced a raise in the procurement prices

for pulses. By June 8, the government procured 1.11 lakh tonnes of pulses. By June 29, rabi pulse procurement figures reached 68,000 tonnes. On July 8, with monsoons picking up, the government expressed its optimism on the rising production of pulses and a fall in its prices. On July 12, a panel was set up by the government for a bonus on the MSP procurement prices, to incentivize pulse production. By July 30, government procurement agencies seemed confident of production estimates and cooling off in pulse prices. On August 6, rising moong output began to hit the market and open-market prices began to fall below the MSP. India, which had been suffering from high tur dal prices, saw some much-needed price relief from September 5. State agencies commenced their procurement of moong in Maharashtra and Karnataka on September 9. By September 12, the central government gained in confidence on its pulses procurement policy and, on September 13, announced a cabinet decision to raise its buffer stock to 2 million tonnes. On September 17, the Cabinet Committee on Economic Affairs (CEA) announced its intention to create the condition for a pulses revolution. The downward turn in pulses prices continued, as moong prices once again slipped below MSP.

On September 19, experts expressed their opinion that the FCI mess should not be replicated in the pulse procurement and distribution programme. Government set up 200 agencies for the pulse procurement programme by end-September. By October 5, government agencies procured 3,750 tonnes of kharif pulses at MSP. Experts also opined, by October-end, that the pulses policy needs to break new ground. The notorious tur dal prices finally came under check on December 9 as farmers cried out for government support under the MSP programme. The government-led National Agricultural Federation (NAFED) commenced procurement of tur dal on December 22. As on December 27, the government seemed to miss its 2 million tonne procurement target. There was good news for procurement agencies on December 29, when tur dal prices slipped below the MSP. On January 5, sellers of pulses sought a lifting of export bans in order to benefit from higher prices overseas. On Feb 9, tur dal prices fell below the MSP in Maharashtra. The purchase of pulses for buffer stocks exceeded 1 million tonnes by February 10. Rising pulses prices were seen as one of the major causes of inflation and which became a political issue at the turn of the beginning of the crop cycle, turned around to below MSP prices by the end of the crop cycle. Considering the success in the production incentive scheme achieving record levels, and the cooling of market prices below the MSP, the government, on February 17, expressed its satisfaction in India's self-sufficiency in pulses in the next few years.

Good Monsoons: Kharif sowing commenced on June 11, 2016 with the onset of timely monsoons, and pulses were one of the top crop choices, on account of the prevailing high prices, in the classic Cobweb Model framework. Monsoons progressed slowly as on June 18, and gathered momentum on June 29, when the government procurers became optimistic of a possible fall in pulse prices around harvest time. This got confirmed by July 9 as the pace of monsoon picked up further. By July 30, the acreage under pulses was on track as the pace of the monsoon was maintained. On August 4 and 16, very heavy rains provided indication of a bumper harvest in pulses and an imminent fall in the prices. On August 20, signs of a record harvest emerged. Talks of a cooling off of inflation on account of falling pulse prices emerged on September 7, based on a potentially record harvest of pulses. On

September 14, the production estimates were placed at 8.2 million tons, an increase of 48% over the previous year's comparative figure. Gujarat witnessed a 100% increase in kharif sowing. Rabi sowing estimates were 16% up as reported on November 12, which rose to 27% by December 3. Demonetization had no adverse impact on rabi sowing. On December 17, pulses production pulled up the rabi production above the latest 5-season average. On December 24, a week later, it was confirmed that pulses and oilseeds were responsible for the best rabi output in the latest 5 years. On Feb 16, it was finally reported that good monsoons were responsible for India's best ever grain output, and the production of pulses played a major role in this achievement.

Imports: The government has been pursuing a policy of resorting to imports to cool off inflation and to augment its buffer stocks, in the light of domestic supply constraints. It has avoided imports from Canada and Australia and focused instead on Myanmar and Mozambique. Interestingly, the extant internal transport and logistics bottlenecks costs make it easier to import and distribute pulses quickly to contain inflation, rather than moving stocks within India.

13,000 tons were imported to check rising pulse prices, as reported on June 8. Another 5,000 were proposed to be imported through government agency MMTC, reported on June 13. The government cleared imports from Myanmar and Mozambique, as reported on June 16 and 22, as also July 6. This trend continued until July 29 and spilled into August 5. A cooperative endeavor for import of pulses from BRICS nations was made on September 24. When imports get delayed, importers and local traders take advantage of temporary shortages and cause price spikes, as witnessed in chana dal prices on January 5.

Hoarding: The evil of hoarding affects consumers directly, and impacts consumer inflation and household-level inflation adversely, independent of production and import statistics.

Inflation is an extremely politically-sensitive issue. The Opposition Congress party has alleged that the government has ignored instances of hoarding; vide reports on July 29 and 30.

Another news report in DNA-Mumbai, July 30, 2016 stated that the cost of lentils was Rs.60 per kg, while it was being sold at Rs.200 per kg. The government has taken this matter head-on. Ministry for Consumer Affairs' (MCA) Ram Vilas Paswan, on May 11, sought the cooperation of state governments to place a cap on pulse prices at Rs.120 a kg. States too, are responsible for high pulse prices, as reported on August 4. On September 17, Paswan asked states to work with traders to sort out supply-related issues. On July 20, the Competition Commission of India (CCI) initiated a probe into high pulse prices. On August 5, it was reported that rising imports fail to arrest rising prices. On September 13, the central government considered invoking the Essential Commodities Act to curb the price of pulses. This appeared to be a step in the right direction as the prices of pulses went up 20% on September 20, ahead of the festive season.

Markets: At the beginning of the period of observation, May 29, pulse prices showed an upward trend. The slow initial pace of monsoons led to a sustained increase in pulse prices. In the organized markets, SEBI suspended trading in chana futures due to a surge in prices, as reported on June 17. There is a problem when those having a dominant control over physical stocks deal in the futures markets. On June 20, it was

reported that surging chana prices surpassed the prices of tur for the first time. The tide began to turn around August 25, when farmers began to despair over the falling prices of pulses. On November 18, a steep correction was seen in pulse prices. Finally, around January 6, pulse prices were reported to be below MSP in 200 markets; tur dal prices halved, and other pulse prices had fallen 20%.

Pulses in Substitution of Other Crops: Sugarcane has been the bane of agriculture, since it is a water-guzzler in water-scarce Maharashtra. Sugarcane has been perceived as cash crops. Realization has dawned, and in the light of rising pulse prices, cropping patterns have shifted in this direction, as reported on May 11. On July 23, a similar trend was witnessed in the case of cotton, with a 39% drop in cotton cultivation as the crop choice shifted in favour of pulses. Going by the increased acreage in favour of pulses and the bumper crop, the MSP incentive for pulses seems to have worked. The most interesting view was reported on August 3, highlighting soya as a low-price substitute for pulses, with a request to policy-makers to follow up, to control inflation. Besides, soya is also high in protein.

The impact of these 6 factors on the Price Sentiment is summarized in Table 1.

Table 1: Impact of Relevant Factors on Price Sentiment

Factor	*Price Sentiment 1*	*Price Sentiment 0*
MSP	*Will incentivize production of pulses as was the case with wheat and rice*	*Will have no impact if MSP support is not strong enough, as open market prices will go down*
Good Monsoon	*Will incentivize cultivation at the time of sowing, greater acreage*	*Acreage will shrink if crop survival prospects dull or previous crop prices were un-remunerative, or when new crops hit the market*
Imports	*Price sentiment will be up in pre-import stage, or if imports are delayed*	*Price sentiment will be dull post-imports*
Hoarding	*Price sentiment is up pre-festival or when imports or supplies are delayed*	*Price sentiment is down when new supplies hit the market*
Markets	*Price sentiment is up when spot markets are dominated by a person or groups of persons*	*When supply bottlenecks are removed and competition is intense and fair, prices are down*
Pulses in Substitution of Other Crops	*When sugarcane and cotton are less remunerative, and water is scarce, pulses are expected to be more remunerative*	*When cash crops like sugarcane and cotton are highly remunerative, acreage under pulses will reduce as price sentiment is low*

The underlying reasons for the Price Sentiment movements provide more depth to the understanding of the Cobweb phenomenon.

Concluding Observations

The Cobweb Model is a distinct theory on its own, particularly in perishable commodities like pulses, and its existence is simple to prove on an empirical basis, from season to season and across seasons, due to its unique price pattern. An understanding of the Cobweb model or its existence will enable producers and consumers to temper their price expectations and narrow the price fluctuations, and reduce the un-synchronized nature of demand and supply. Buffer stocks can be maintained on a strategic basis- however, this is difficult on account of the perishable nature of pulses since its shelf life is 2 to 3 months. Long-term procurement contracts with Mozambique are a step in the right direction. Reduction of the frictions between demand and supply will also reduce price swings, reduce option premium prices, stabilize spot prices, keep futures prices within a narrower range and reduce spot-future arbitrage. A good beginning has been made by the government to bring pulse prices under control through a wide slew of measures.

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GREEN BOND: A SOCIALLY RESPONSIBLE INVESTMENT (SRI) INSTRUMENT

Pradiptarathi Panda

Abstract:

Green Bond attracts a specific group of investors and helps issuers as well as to the economy at large. This innovative financial instrument was issued in the year 2008 by World Bank with the request of investors. Now this instrument is gaining popularity world-wide. So far World Bank has made 130 issues in 18 currencies in totaling of US$5.7 billion. Followed by World Bank, there are several institutions, which are issuing this instrument. The present study aims to state the genesis of Green Bond, its inception and the road ahead so far with current statistics.

Key Words:

Green Bond, World Bank, Social Responsibility

Introduction

"Climate change is not just an environmental challenge. It is a fundamental threat to economic development and the fight against poverty."

*- **Jim Young Kim***
President, The World Bank Group

The term green has been used along with several popular usages like green finance, green investment, green bank, green card, green job, green city, green marketing,

green bond, green equity, green tax, green project etc. To avoid risks and impacts of environmental degradation, the World Bank finance, among others, through innovative financial instruments like green bonds. Green bonds are specially used to finance environment friendly projects. Environment friendly projects are related to clean water, water, waste water, renewable energy, energy efficiency, river/habitat restoration, acquisition of land or mitigation of climate change and solid waste management etc. This green bond helps to narrow down the environmental investment gap. It is a fixed income security to raise capital for specific environmental benefit projects. These bonds are innovative tax exempt financial instruments. London Stock Exchange defines Green Bond as "Green Bonds are any type of bond instrument where the proceeds will be exclusively applied to finance or re-finance in part or in full new and/or existing eligible 'green' projects." The World Bank first introduced green bonds in November 2008 with investors request with collaboration of *Skandinaviska Enskilda Banken (*SEB) and a group of investors to support climate change mitigation and adoption projects of World Bank in developing countries. So far, the World Bank has made 130 issues of green bond in 18 currencies valuing US $ 9.1 billion (World Bank, 2016). Prior to green bonds, international financial institutions have been issuing climate bond to support environmental projects but is limited for investment only in low carbon climate resilient economy. Islamic green bond in Islamic finance is known as green sukuk ('sakk' plural form is sukuk meaning an instrument similar to bond) which aims at to fund low carbon development or environmental projects. Now Malaysia is trying to first issue for green sukuk. World bank's eligible mitigation and adaptation projects are given in Table-1.

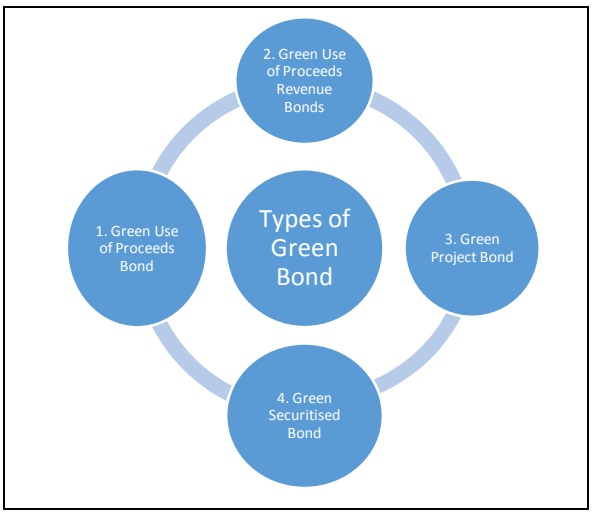
Table -1: World Bank Green Bond Project Selection criteria

Sl. No.	***Eligible mitigation projects***	***Eligible adaptation projects***
1	*Solar and wind installation*	*Protection against flooding (including reforestation and watershed management)*
2	*Funding for new technologies that permit significant reduction in green house gas (GHG) emissions*	*Food security improvement and implementing stress-resilient agricultural systems (which slow down deforestations)*
3	*Rehabilitation of power plants and transmission facilities to reduce GHG emissions*	*Sustainable forest management and avoid deforestations*
4	*Greater efficiency in transportation, including fuel switching and mass transport*	
5	*Waste management (methane emissions) and construction of energy efficient buildings*	
6	*Carbon reduction through reforestation and avoid deforestation*	

Source: http://treasury.worldbank.org/cmd/pdf/ImplementationGuidelines.pdf

This innovative financial instrument is a plain vanilla instrument and is famous for its simplicity, liquidity and credit worthiness. These bonds are the front runners to fund environmental investment and have gained significant attention from both investors and environmentalists. The demand for investment in climate related projects increases as number of investors incorporate environmental social and governance criteria (ESG) into their analysis. The main investors for green bonds are the institutional investors who held 72% of long-term investment in the world's US $95 trillion bond market. There are 4 types of green bonds, such as green use of proceeds bond (it is a standard recourse to the issuer of debt obligation), green use of proceeds revenue bond (it is a non-recourse to the issuer of debt obligation and can be invested in related and unrelated green projects), green project bond (investors have direct exposure to risk of the projects) and green securitized bond (collateralized by one or more specific projects) based on the design of the product. Different types of Green Bonds have been presented in Figure-1.

Figure-1: Types of Green Bond



Source: ICMA 2016)

The international capital market association (ICMA) serves as secretariat, has administrative duties and provides guidance for the governance of the green bond principles and other issues. The governance framework for green bond includes membership eligibility and forming of executive committee. The executive committee includes underwriters, issuers and investors with global geographic representation.

How Green is a Green Bond?

An environmental friendly investment bond is known as "Green Bond". These are fixed Interest bearing financial instruments

(bonds) invested for climate change solutions. The purpose of issuing green bonds is to raise capital for investment in new and existing environmental projects. Green bonds are similar to traditional bonds with the exception that the fund raised through issuing green bonds is only used to finance environmental projects. Issuers of green bonds maintain the transparency by formal monitoring and verification by auditors and environmental specialists.

Green Bonds of World Bank support projects in 19 countries. For example- one project in each of these countries like-Brazil, China, Colombia, Dominican Republic, Jamaica, Jordan, Macedonia and Serbia, Montenergro, Morocco and one in Turkey; two projects in Indonesia, Tunisia and Ukraine; three projects in India, four projects in Mexico and 12 projects in China. The World Bank Green projects are funded through World Bank green bonds. A few examples are given below:

- *The International Bank for Reconstruction and Development (IBRD) financed Indonesia-water resources and irrigation management programme 2 by issuing green bond worth US$150 million. This project is expected to benefit 500,000 farmer households with efficient and reliable irrigation water and produce 15% more crops.*

- *The IBRD financed US $ 500 million in 2011 for Turkey Update on Private sector Renewable Energy and energy efficiency project.*

- *IBRD financed China-Shandong Energy Efficiency worth US$150 million.*

- *In India IBRD financed in 5 projects so far through green bonds. These are- US$ 400 million for Rampur Hydropower project for scale-up access to renewable energy, to improve Government capacity for climate friendly urban transport solutions it financed US$105.23 million in its sustainable urban transport scheme and financed US$600 million for power sector development project IV to strengthen India's transmission infrastructure resulting in decreased green house gas emissions through efficiency gains.*

Why to Invest in a Green Bond?

There are so many positive outcomes of investing in Green bonds. Those are given below.

i. *It acts as a good vehicle for supporting environmental investment on a large scale and cure the environmental investment gap.*
ii. *It does not support higher risk of default projects like new and unproven technologies.*
iii. *It gives investors an opportunity to effortlessly integrate environmental initiatives into their portfolios.*
iv. *These bonds are Aaa/AAA rated investment instrument.*
v. *Investment in green bonds is tax exempted.*
vi. *These bonds are liquid and well-priced.*
vii. *It ensures a stable and integrated policy environment.*
viii. *It addresses market failures.*
ix. *Green bonds provide a national infrastructure road map.*
x. *It facilitates the development of appropriate green financing vehicles.*
xi. *It reduces the transaction costs of green investment.*

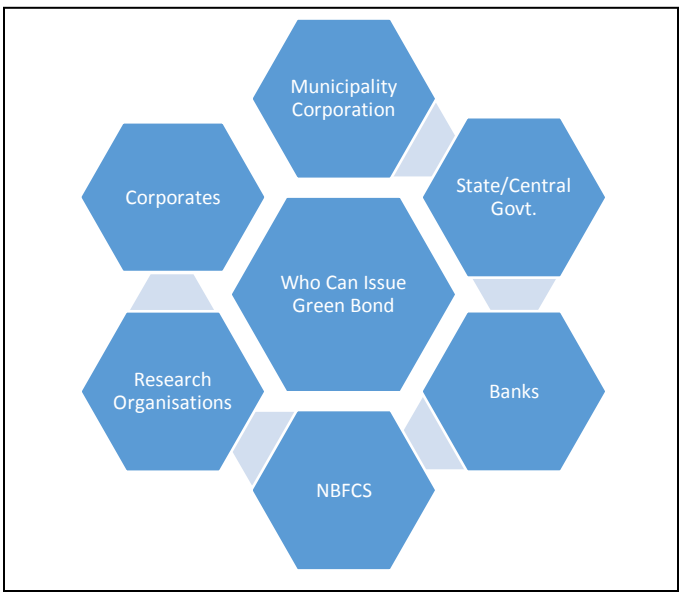
xii. *It promotes public private dialogue on green investments.*

xiii. *It promotes market transparency and improves data on infrastructure investment.*

Issuers/Borrowers of Green Bonds:

The issuers are the institutions which are issuing bonds to the public on the basis of an interest rate, maturity date and value back in full. An issuer may be a corporate, Municipality corporation, State or central Government, Bank, Non-Banking financial company or research organization. These include international financial institutions (like World Bank), Governments, Private Corporations and commercial corporations. This is presented in Figure-2.

Figure-2: Issuers of Green Bond



The process of issuing Green Bond starts from identification of high quality assets followed by mitigating residual risks, enhancing credit rating, get green certification and finally select appropriate listing. This has been presented in Figure-3. Major issuers of Green Bonds are World Bank, International Financial Corporations (IFC), Asian Development Bank (ADB), European Investment Bank (EIB), Export Development Canada (EDC), EXIM Bank Korea etc.

This has been presented in Table-2.

Figure-3: Process for Issue of Green Bond

Table -2: Green Bonds and Related Issues (2007-2013)

Sl. No	*Issuing Institutions*	*Nature of Organization*	*Types of Bond*	*Where do they Invest?*	*No. of Issues*	*Amount issued (US$, Millions)*
1	*World Bank*	*Public*	*Green bond*	*Member countries*	*66*	*6,300*
2	*European investment Bank*	*Public*	*Climate Awareness bond*	*Member countries plus outside the European union*	*26*	*3,479*
3	*International Finance Corporation*	*Public*	*Green bond*	*Member countries*	*8*	*2,001*
4	*Kommunalbanken AS*	*Public, Norway*	*Green bond*	*Norway*	*8*	*175*
5	*African Development Bank*	*Public*	*Clean energy bond*	*Japan*	*7*	*838*
6	*European Bank for Reconstruction and Development*	*Public*	*Environmental sustainability bond*	*Member countries (Issued in 39 currencies)*	*7*	*376*
7	*Asian Development Bank*	*Public*	*Clean energy bond*	*Member countries*	*6*	*794*
8	*Nordic Investment*	*Public*	*Environmental*	*Member*	*4*	*412*

	Bank	*(Owned by- Denmark, Estonia, Finland, Iceland, Latvia, Lithuania, Norway and Sweden)*	*support bond*	*countries*		
9	*Export- Import Bank of Korea*	*Public*	*Green Bond*	*World Wide*	*1*	*500*
10	*US Government agencies and utilities**	*Public*	*Qualified energy conservation bonds (QECB) program and clean renewable energy bonds (CREB) program*	*United States*	*-*	*895*
11	*Topaz solar farms LLC*	*Private*	*Wind project bond*	*California*		*850*
12	*Alta wind energy center***	*Private*	*Wind project bond*	*California*	*-*	*580*
13	*Shepherds flat wind farm*	*Private*	*Wind project bond*	*Gilliam and Morrow Counties, Oregon*		*525*
14	*Sunpower/Andromeda finance*	*Private*	*Solar project bond*	*Italy*	*-*	*260*
15	*US entity common wealth of Massachusetts****	*Public*	*First municipal green bond*	*US*	*-*	*100*
16	*Export Development Canada (EDC)*****	*Public*	*Green bond*	*World Wide (around 180 countries)*		*300*
17	*Electricite de France (EDF) a French Energy Company****	*Public*	*Green Bond*	*France*	*-*	*1900*
18	*Unilever*****	*Private*	*Green Bond*	*Several countries##*	*-*	*250*
19	*Iberdrola (an Electricity Company)*	*Private*	*Green Bond*	*European Countries*	*-*	*750#*

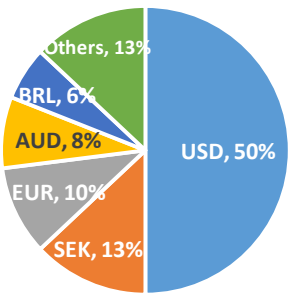
Source: Bloomberg/TD Economics/OECD

*****, ***, **and * indicates data up to 2014, 2013, 2010 and 2012 respectively. # indicates figure in millions Euro.*

Detergent factory and ice cream factory in Johannesburg, South Africa; a laundry powder facility in Sichuan, China; a Home and Personal Care factory in Selcuklu-Konya, Turkey; the expansion of a spreads factory in Kansas, US; and the 'Lean & Green Freezer' cabinets project in Turkey, Russia and the US.

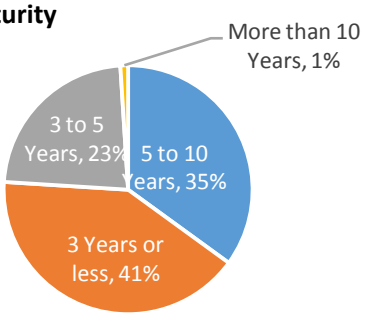
So far, Green Bonds have been issued in several currencies, among them World Bank has issued in 18 currencies, IFC has been issued in seven currencies and EIB has issued in six currencies. World Bank green bond issuance by currency and maturity is given in Figures - 4 and 5 respectively.

Fig-4: World Bank Green Bond Issuance By Currency



Source: World Bank (2016)

Fig-5: World Bank Green Bond Issuance by Maturity



Source: World Bank (2016)

Investors/Lenders of green Bonds:

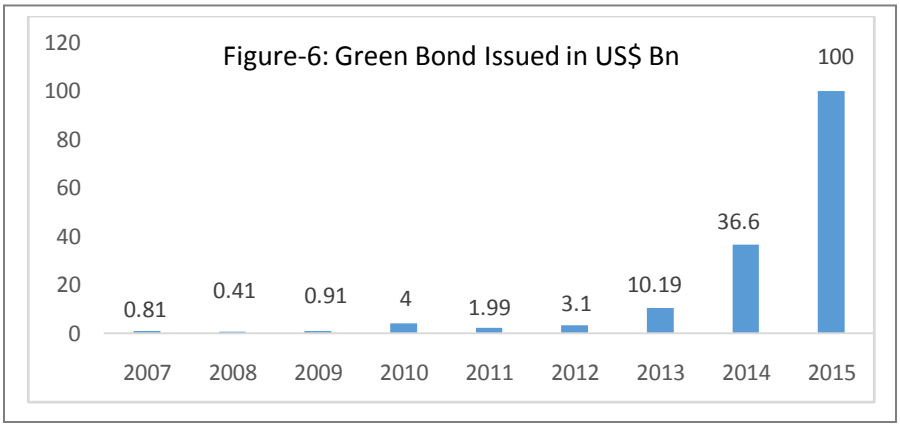
The investors for green bonds are mainly the institutional investors like pension funds, insurance companies and sovereign wealth funds. Households are also investing in green bonds but on a smaller scale. For example, the World Bank issued a set of green bonds to households in the Japanese Uridashi bond market. Major investors of World Bank Green Bonds are given in Table- 3.

Table -3: World Bank Green Bond Investors	
Investors	***Investors Category***
Adlerbert Research Foundation	*Research Organization on sustainable development*
AP3 – Third Swedish National Pension fund	*Pension Fund*
California State Treasurer's Office	*Treasurer*
Calvert Investments	*Investment management company*
Deutsche Asset & Wealth Management	*Investment management company*
FMO (Netherlands Development Finance Co.)	*Development Bank*
MISTRA	*An Independent Research Institute*
Nikko Asset Management	*Investment management company*
Rathbone Green Bank	*Green Bank*
SEB Ethos rantefund	*Corporate and Investment Bank*
SEB TryggLiv	*Corporate and Investment Bank*
Sonen	*Investment Management Firm*
TIAA-CREF	*Life Insurance Company*
UN Joint Staff Pension Fund	*Pension Fund*
ZKB (Zurcher Kantonalbank)	*Banking and Financial Services*
AP2 – Second Swedish National Pension Fund	*Pension Fund*
Blackrock	*Mutual Fund*
CalSTRS	*Pension Fund*
Church Sweden	*Asset Management Company*
Everence Financial	*Financial Service Organisation*
LF Liv	*Insurance Company*
New York Common Retirement Fund	*Retirement Fund*
Pax World Balanced Fund	*Mutual Fund*

Sarasin	*Asset Management Company*
SEB Fonden	*Corporate and Investment Bank*
Skandia Liv	*Insurance company*
State Street Global Advisors	*Investment Management Company*
Trillium Asset management, LLC	*Asset Management Company*
WWF-Sweden (Varldsnaturfonden)	*Financed WWF (Currently funds around 1,300 conservation projects) for Environmental protection projects*

Source: http://treasury.worldbank.org/cmd/htm/GreenBondIssuancesToDate.html

Among the investors, Investment Banks 28%,asset management companies share is 21% followed by investment banks 17%, pension funds 17%, research organizations 7%; development bank, green bank and life insurance companies represents 3% each. The year-wise growth of green bond markets in US $ billion has been presented in Figure -6.



Example of each issuer:

1. The World Bank:

The maturity period for green bond falls in 5-10 years range which are regarded as medium to long term investments and yields range from 0-3% and 3-10%.

Table - 4:World Bank Green Bond Issuance				
Volume	***Coupon***	***Issue Date***	***Maturity Date***	***Lead Manager and Investors***
USD 300 Millions	*Floating*	*24th April 2009*	*2012*	*SEB*

USD 180 million	*2.00%*	*4th December 2009*	*2013*	*SEB/California State Teachers' Retirement System (CalSTRS), and the Swedish life insurance provider SEB Trygg Liv, Swedish National Pension Funds - AP2 & AP3 and The United Nations Joint Staff Pension Fund (UNJSPF)*
SEK 3.350 Billion	*3.50%*	*24th November 2008*	*2014*	*SEB/ The United Nations Joint Staff Pension Fund , Länsförsäkringar, Skandia, AP3 (Third Swedish National Pension Fund), AP2 (Second Swedish National Pension Fund)*
NZD 150 Million	*5.23%*	*2nd February 2010*	*2015*	*Daiwa Securities/Specially for investors in Japan (Retail and Institutional Investors)*
AUD 280 Million	*6.00%*	*5th March 2010*	*2017*	*TD securities/*
BRL 540 Million	*9.50%*	*2nd March 2010*	*2017*	*JP Morgan/*
HUF 7.950 Million	*5.50%*	*2nd March 2010*	*2017*	*SEB/*
NOK 400 Million	*3.75%*	*2nd March 2010*	*2017*	*SEB*
NZD 50 Million	*5.63%*	*3rd March 2010*	*2017*	*RBC (Royal Bank of Canada)*
RUB 750 Million	*7.50%*	*22nd February 2010*	*2017*	*JP Morgan*
SEK 1.575 Million	*3.25%*	*2nd March 2010*	*2017*	*SEB/ WWF-Sweden, Church of Sweden, European private banks and life insurance companies and Swedish National Pension Fund AP3*
TRY 75 Million	*10.00%*	*2nd March 2010*	*2017*	*JP Morgan/*
ZAR 850 Million	*8.75%*	*3rd March 2010*	*2017*	*TD Securities/*
MXN 1.250 Billion	*7.50%*	*5th March 2010*	*2020*	*TD Securities/*
COP 182 Billion	*8.00%*	*2nd March 2010*	*2020*	*JP Morgan/*

Source: http://treasury.worldbank.org/cmd/htm/GreenBondIssuancesToDate.html

Note (All 130 issues of World Bank are available in above link.
[Notes: USD- United States Dollar, SEK- Sweden Krona, NZD-New Zealand Dollar, AUD-Australia Dollar, BRL-Brazil Real, HUF- Hungary Forint, NOK- Norway Krone, RUB-Russia Ruble, TRY- Turkey Lira, ZAR- South Africa Rand, MXN-Mexico Peso, COP- Colombia Peso]

Summary of first US Dollar – denominated Green Bond terms	
Issuer	*International Bank for Reconstruction and Development (IBRD)*
Rating	*Aaa/AAA*
Total amount	*US$300m*
Investor	*State of California Treasurer's Office*
Settlement date	*April 24, 2009*
Maturity date	*April 24, 2012*
Coupon	*Floating rate*
Lead manager	*SEB*

Summary of Inaugural Green Bond Terms			
Issuer	*International Bank for Reconstruction and Development (IBRD)*		
Rating	*Aaa/AAA*		
Tranches	***Tranche 1***	***Tranche 2***	***Tranche 3***
Lunch date	*Nov. 6, 2008*	*Nov. 14, 2008*	*Feb. 6, 2009*
Amount	*Kr 2.325 bn*	*Kr 375 mn*	*Kr 150m*
Settlement date	*Nov. 12, 2008*	*Nov. 24, 2008*	*Feb.13, 2009*
Aggregate amount	*Kr 2.85bn*		
Maturity date	*Nov 12, 2014*		
Coupon	*3.5% (per annum)*		
Lead manager	*SEB*		
Syndicate	*Credit Suisse International-Senior co-lead manager*		
	Lands Bank Baden-Wurttemberg-co-lead manager		
Investors	*AP2 (second Swedish National Pension Fund)*		
	AP3 (third Swedish National Pension Fund)		
	Lansforsakringar Bank and Forsakring		
	MISTRA		
	Skandia Life		
	The United Nations Joint Staff Pension Fund		
	Others		

Source: Reichelt Heike (2010)

Worldwide the size of Green Bond market is growing at a very fast pace. It has reached 100 US Billion Dollar. MD Bank of America Merrill Lynch (BofA-ML) - Suzanne Buchta says global green bond sales are likely to touch **$150 billion** this year (ET-FEB 16, 2016). This has been presented in Figure - 6.

Green Bonds in India

IBRD financed 5 projects in India so far. The detailed of these projects are provided in the following paragraphs.

a. **Power system development project IV:** For strengthening India's transmission infrastructure results in decreased green house gas emissions through efficiency

gains, IBRD financed US $ 600 million for the period of 2008- 2014. This project aims at to remove the in-efficiency of power system in India. It helps for India's clean energy initiative by strengthening India's ability to transfer surplus hydro energy to power deficit regions, increase transmission efficiency and avoids building additional coal based generation. Power Grid Corporation of India borrowed from IBRD and implemented this project. The total cost of this project is US $ 2114.00 million out of which IBRD financed US $ 600 million. The rest amount of US $ 1514.00 million was borrowed from other sources.

b. **Rampur Hydropower Project, Himachal Pradesh:** IBRD financed US $ 400 million in this project to add renewable, low carbon hydroelectric power to India's northern electricity grid and improve the effectiveness of environmental and social sustainability of hydropower design and management in India. This project financed for the construction of 412 MW Rampur run of the river hydroelectric scheme. The project aims to provide electricity facility to the rural areas where electricity is not yet available. The project term is from 2007-2014. The total cost of the project is US $ 670.00 million out of which US $ 400.00 million has been funded by World Bank. The Satluj Jal Vidyut Nigam Ltd is the borrower and implementing agency of this project.

c. **Sustainable Urban Transport:** India is the third largest green house gases emitter (GHG) after China and US. Increasing Air pollution now creates so many health problems in India. This project focuses on public and non-motorized transport like bicycles and foot paths for pedestrians in six selected Indian cities. The project aims at reducing 128,000 metric tons (MT) of CO_2 over 10 years. Government of India borrowed from World Bank worth US $ 105.23 million for the total project of US $ 328.33 million. The ministry of urban development, Government of India implements this project whose term is from 2009-2015.

d. **Andhra Pradesh Water Sector Improvement:** IBRD has committed USD 450.6 million to improve irrigation services on a sustainable basis to strengthen the states institutional capacity for multi sectoral development and of its water resources. Its target is to increase cropping intensity, crop diversity, and productivity of crops, livestock and fish.

e. **Eastern Dedicated Freight Corridor:** For development of transport sector, IBRD has provided USD 1,100 Millions to increase the capacity and quality of freight rail service. The target is to build 1,113 kms of new freight only rail, Axle-load limit raised from 23 to 25 tones increasing speeds and 12.8 million tons of CO2 eq. emissions reduced over a 30 year period.

2. European Investment Bank:

In 2007, the European Investment Bank first issued the climate awareness bond to invest in climate related projects across Europe and around the World. It has issued EUR 4.3 billion in 26 issues. Select issues are shown in Table 5.

Table -5: EIB Climate Awareness Bonds					
Currency	Volume in currency (m)	Volume in EUR (m)	Coupon	Issue date	Maturity
EUR	500	500	1.375%	25/02/2014	15/11/2019
SEK	900	103	3.00%	19/02/2014	23/04/2019
ZAR	250	17	6.75%	03/02/2014	15/09/2017
EUR	350	350	1.375%	20/01/2014	15/11/2019
CHF	350	283	1.625%	04/02/2014	04/02/2025
EUR	600	600	Floating	05/07/2007	28/06/2012
SEK	550	52	Floating	17/11/2009	17/02/2015
SEK	1700	162	2.95%	17/11/2009	17/02/2015
BRL(JPY)	60(2,912)	15	0.50%	15/03/2010	16/03/2016
BRL(JPY)	303 (15,124)	123	8%	15/03/2010	16/03/2015
ZAR	86	8	7.43%	15/03/2010	17/03/2014
AUD	18	12	4.83%	15/03/2010	17/03/2013
ZAR	1375	139	6.68%	20/05/2010	29/05/2013
AUD	231	161	4.27%	20/05/2010	21/11/2013

Source: European Investment Bank-www.eib.org

3. International Finance Corporation (IFC):

IFC green bonds are designed for renewable energy, energy efficiency and other climate smart projects in developing countries. It first issued Green bond in 2010 and so far it has issued US $ 3.5 billion through green bonds (Table 6).

Table -6: IFC Green Bond				
Currency	Volume in USD Millions	Trade date	Maturity date	Lead Manager
USD	200.00	15/04/2010	28/04/2014	SEB
AUD	42.4	15/02/2011	24/02/2014	Nomura (an Investment Management Company)
AUD	44.8	10/05/2011	19/05/2014	Nomura
EUR	22.8	10/05/2011	19/05/2014	Nomura
ZAR	25.9	10/05/2011	19/05/2014	Nomura
AUD	37.1	23/05/2011	27/06/2014	Nomura
ZAR	60.8	23/05/2011	03/06/2014	Mitsubishi (A Japan MNC, Financial service company)
TRY	113.7	20/09/2011	29/09/2015	Nomura
AUD	74.4	20/09/2011	29/09/2015	Nomura
USD	500.0	26/04/2012	15/05/2015	JP Morgan
TRY	88.2	13/08/2012	20/08/2015	Nomura
BRL	11.8	13/08/2012	20/08/2015	Nomura
AUD	12.5	14/08/2012	20/08/2015	Nomura

USD	10.0	04/02/2013	15/02/2023	JP Morgan
USD	1000.0	14/02/2013	16/05/2016	Citi/JP Morgan/Morgan Stanley
AUD	20.7	16/10/2013	16/10/2018	Nomura
BRL	198.5	16/10/2013	13/10/2016	Nomura
USD	1000.0	15/11/2013	15/11/2016	BAML/Citi/Credit Agricole/SEB

Source: www.ifc.org

Green Bond in India by IFC:

IFC financed $ 3 million to JK paper, India to carry out resource efficiency assessments which significantly reduce costs, energy consumption and water usage. This project resulted in annual GHG reductions of 20,000 tons of CO_2 equivalent and savings of 10 million kilowatt hours of electricity and 1.5 million cubic meters of water which also saves $ 2.7 million annually. IBRD financed 5 projects in India so far. The detailed of these projects are given in Table 7.

Examples of some Indian labelled green bonds are presented in Table-7.

Table-7: Green Bonds of 2016:Indian Labelled green bonds, January to September

Sl. No	Date	Issuer	Amount	Coupon	Certified/ Reviewed	Theme
1	Feb 2016	Hero Future Energies	INR3bn	0	Climate Bonds Standard	Renewable Energy
2	May 2016	PNB Housing Finance	INR 5bn	n/a	n/a	Low Carbon Buildings
3	June 2016	Axis Bank	USD 500m	2.875	Climate Bonds Standard	Renewable energy, Low carbon buildings and transport
4	Aug 2016	ReNew Power	INR 5 bn	10.4	Climate Bonds Standard	Renewable Energy
5	Aug 2016	NTPC	INR 201bn	7.375	Climate Bonds Standard	Renewable Energy
6	Aug 2016	Greenko	USD 500m	4.875	Sustainalytics	Renewable Energy
7	Sept 2016	Yes Bank	INR 3.3bn	n/a	n/a	Renewable Energy

Source-HSBC (2016)

Concluding Observations

*"Green Bonds have opened a new finance flow that will be essential to confronting climate change." - **Rachel Kyte**, World Bank (2015), World Bank Group Vice President and special envoy for climate change.*

Green finance in India is not so much popular. So far, World Bank has invested in 5 green projects and International Finance Corporation has invested in one green project in India. There are indirect investments in green projects from organizations. Since green bond is a new concept, as it came in 2008, emerging and developing country like India has to issue and invest in green projects to get benefit out of that. Ahmedabad Municipal Corporation (AMC) on 26th June 2012 declared to issue green bond through two schemes. One is "AMC green bond scheme" and another is "Own a tree concept". The funds from issuing these bonds will be invested for maintain and nurturing tree for 3 and 5 years respectively by paying individuals Rs 150 and Rs. 250 to take care per tree. Another organization – Indian Renewable Energy Development Agency Ltd. raised about 7.2 billion rupees tax free bonds to help finance clean energy projects. National Bank for Agricultural and Rural Development (NABARD) has been organizing workshop on "Opportunities in Green Finance" through its natural resource management center (NRMC).

Business and environment are opposite to each other. Business causes poisoned water, dirty air, decimated landscapes and global warming. Green bond solves all these environmental related problems. Green bond market is in infancy stage and mostly to the international financial institutions only. There is more scope for growth in the green bond market. The supply as well as demand for green bond market has to develop. Financial institutions and Government should be concerned about this innovative financial instrument. At present, the size of the green bond market is very small to global bond market (it is 0.4% of the US$ 95 trillion global bond market). It is suggested that financial experts, investors, Governments and environmentalists should closely and eagerly look on green bond which is going to create new development in environmental financing.

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IMPACT OF PRICE LIMIT ON STOCK PERFORMANCE

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Abstract:

Stock based price limits is a structural mechanism aimed at preventing excessive volatility in stock prices, preserving liquidity and preventing panic buying or selling. In the recent times, stock exchanges in addition to imposing additional margins are using price limits as a structural tool to dis-incentivize price manipulation in stocks. Past empirical studies conducted using data of global stock exchanges, reported that price limits delay price discovery, and as a consequence take away the liquidity in the stock. This study aims at assessing the impact of stock based price limits on price discovery and trading activity using data from National Stock Exchange. The results indicate that price limits delay price discovery. Volumes of shares traded remain at much higher level for 5 days after the event day. The Cumulative Average Abnormal Returns on the stocks hitting upper price band continue to increase after the event day. Hence, it is felt that price limits may have limited impact on trading volumes and stock returns.

Key Words:

India, Stock Market, Price Limit, Stock Price Manipulation

1. Introduction

Primary objective of market regulation is to ensure that markets are efficient, fair and less susceptible to Market crashes. Market structure affects the speed and quality of price discovery, liquidity, and the cost of trading (Madhavan, 2002). Efficient price discovery and ability to trade at low costs matter to all investors. Globally, stock exchanges use market wide circuit breakers, stock based circuit breakers, price bands to protect market stability and prevent extreme irrational movements to stock

prices. Academic literature examining the utility of these restrictions presents conflicting opinions. Kim and Rhee (1997) conclude that stocks that hit the price limit exhibit higher levels of volatility, delayed price discovery and increased trade volumes on the day after the price limit hit. As against this, Ohuche and Ikoku (2014) conclude that higher price limits help in moderating price volatility in Nigerian stock markets. They favour the use of symmetric price limits as opposed to asymmetric ones, as they help in moderating price volatility.

Despite there being such conflicting evidence against price limits, Indian stock exchanges have incorporated both market wide circuit breakers and also price limits for stocks that are not included in derivative segment or not part of any derivative index. The effectiveness of price limits with respect to price discovery and trading activity in the exchanges needs to be empirically studied. This will be of use to both regulators and market participants. This study attempts to ascertain the impact of price limits on price discovery and trading activity in the National stock exchange, India.

The rest of the paper is organized as follows: Section 2 discusses the application of price limits in the Indian stock exchange. Section 3 covers a review of latest literature on price limits and its implications to market. The section also identifies the need for this study and research gap. Section 4 details the research methodology. Section 5 presents the results and discussions. Section 6 provides conclusions and scope for further research.

2. Application of Price limits at Stock Exchange

At the stock level, both the National Stock Exchange (NSE) and Bombay Stock Exchange (BSE) apply daily trading price limits in bands of 20%, 10% and 5%, for stocks that are not traded in the derivative segment and are not part of any derivative Index. For the stocks excluded from daily trading price limits, the exchanges apply dynamic price bands with the objective of preventing fat finger errors i.e. errors in punching order prices during trading.

In daily trading price limit, the exchange specifies the upper and lower price bands for the stocks based on the previous days closing prices of the stock. On the trading day if the last traded price of the stock reaches this upper or lower price band it said to be in upper or lower circuit respectively. Once the stock prices hit the price limits, trading is not halted like in Market wide circuit breaker. Trading is permitted at prices within the specified bands for the day. Unlike this in stock based circuit breaker, when the prices of stock reach the upper or lower limit, trading is halted. News related to the stock is generally disseminated to the investing public. It is expected that such halt will prevent panic and help effective price discovery (Kim and Yang, 2004). Research studies point out many events when price limits prevented the further price crash. Most of the Asian stock exchanges adopted the price band mechanism to curb the volatility and give cooling of period (Rosita, 1992). Price limits are also used to prevent stock price manipulation. Allen and Gale (1992) point out three methods of stock price manipulation. First, Action based manipulation, is based on actions that change the actual or perceived value of the assets. Second, Information based manipulation, where false information and rumors about the stock prices are spread across multiple participants which impact share prices. The regulators have largely

controlled these manipulations through insider trading regulations, suspension of members spreading false rumors etc. The third type of stock price manipulation is trade based manipulation. Here, the trader manipulates prices by simply buying the stock and then selling without taking any publicly observable action or spreading false rumors. This happens because uninformed traders observe sudden changes in volumes and prices of the shares and assume that the same is caused by informed traders and take suitable profitable action based on trade data. Eg: an uninformed trader observes increase in volumes and prices of shares of a specific company, assumes that large trader is informed and is expecting some good news about stock and decides to buy the stock. When sufficiently large number of uninformed traders takes the above action, it will drive the prices up facilitating the exit of the manipulator. When surveillance department of exchanges suspect price manipulation in any of the stocks, they tend to respond to it by imposing additional margins and reducing the price limit bands from 20% to 10% and 5%. Further, the exchange may also transfer the stock to trade to trade segment. In the trade to trade segment, only delivery type transactions are allowed and there is no netting settlement available. The trader will have to pay the full value of the stock bought and also provide delivery for the stock sold. This when applied with price band restrictions tends to increase the capital investment and locks up the same for a longer period of time. It is felt that such regulatory response will help protect market from price manipulations and preserve market integrity.

Empirical study of the impact of imposition of price limits will help in understanding its utility to exchanges and market participants.

3. Review of Literature

Price limits and trading halts are essentially policy responses to curtail extreme stock price volatility, act as a disincentive to stock price manipulation and protect investor confidence in the markets.(Chang and Hsieh, 2008) Empirical investigations of the impact of price limits conducted by Friday and Ikoku (2014) conclude that introduction of price limits in the Nigerian stock exchange create informational inefficiency. Further, some authors have attempted to address the question of what could be an optimal price band for liquid and illiquid stocks. (Chen, Kim, & Rui, 2005) studied the China stock market , Shenghai stock exchange and Shenzen stock exchange and selected two types of A and B set of shares as per liquidity. For calculating liquidity it has been consider the bid and ask spread of order book prices and event study had been performed. It has been concluded that less liquid stock are more susceptible to hitting to price limit. So it has been suggested that price limit should be wider for illiquid stocks as compare to liquid stocks.

(Rhee, 1977) studied the Tokyo stocks exchange daily price limits and conclude that it delayed price discovery and price limits are ineffective. The study consider the time period of 1989 to 1992 daily price limit data. Event study and volatility spillover is calculated. The study also finds our trading interference because of price limit and concludes that the volume for stock increase abnormally after price band hit.

(Farag, 2013) the paper studied the Egyptian (EGX), Korean (KRX) and Thai (SET) stock exchanges. The objective of study to evaluate effect narrow price limits to wider price limits. They used the EGARCH model used for volatility study. It is been concluded that price discovery is disrupted due to the

switch from narrow to wide price limit and closing prices cannot reflect the full price information to investors. (Cho, Russell, Tiao, & Tsay, 2003) used high frequency data of Taiwan stock Exchange to study effects of daily price limits. The study used GARCH model for the 5 min return of each individual stock and find out the magnet effect. The study concluded that asset prices take momentum towards the limits and accelerate as it approaches the limits. So as per this observation it is concluded that price limits are ineffective in controlling overreaction.

(Arak & Cook, 1977) the study examine the US Treasury bond future market between 1980 to 1987. The purpose of the study to evaluate behavior of prices as it nears the price band. The author first theoretically explained the reason for acceleration in prices when it approaches to price band is that, trader think it is like confirmation call for direction of stock price and takes action accordingly. The study further evaluate the daily prices of Treasury bills of US treasury market and concluded that limits act as a stabilizing force and it can calm the market.

The above review shows that in past decade many studies have been conducted to evaluate the impact of price limits on multiple market quality parameters. However exchanges across Asia, Europe and US differ in many ways with respect to their trading architecture and regulations. While Europe and US exchanges have dealer driven markets with market makers who are obliged to provide liquidity throughout the trading period, Asian markets are largely quote driven markets. There is no obligation on any market participant to provide liquidity. Hence, in times of crisis all the participants can withdraw from the markets and liquidity and trading volumes can shrink. Further order matching rules, regulations, presence or absence of call auctions and continuous order matching platforms, cross market arrangement across exchanges and permission for trading after market hours differ widely from country to country. These differences affect market quality parameters differently across different markets. Hence, it is felt that there is a need to specifically study the impact of price limits on market performance in India. Price limit are imposed by exchanges and set on the basis of previous day's closing prices. Price limit event is triggered if the last traded price of the stock hits the upper or lower price limit anytime during the trading hours in the exchange. However, successive upper price limit hit by stocks itself cannot be construed as stock price manipulation. Hence, we refrain from making any such assumption and limit the objectives of study of this paper to the following:

a. To understand the impact of price limits on price discovery and stock returns
b. To understand how price limits affect trading volumes and trading participation in the markets.

4. Research Methodology and Data

Most of literature reviewed use two main methods to capture the effectiveness of Price band. One is GARCH/ARCH models to test the impact of price limits on volatility (Friday and Ikoku, 2014) and second is standard event study methodology (Rhee, 1997). It is felt that the volatility measure is not logical in case of price band because stock price movements are artificially restricted with price limits to control the excessive volatility. So most of the measure of volatility may go undetected or may be ambiguous. Hence, we use event study for this paper.

The data on upper price band hitters is collected from the website of national stock

exchange for a sample of 176 companies, spread across 5 days of trading. The sample size of the companies included in this study is small, as the historical data of price band hitters is not available on the website of the stock exchange and has to be downloaded on a daily basis. The pre and post event data on share price, volume traded and number of trades in the price band hitting stock is obtained from the daily bhavcopy provided by the National stock exchange.

4.1 Impact of price limits on price discovery and stock returns

Once the prices of stock hit the price band for the day, then the event is triggered. The prices of the stock are not permitted to move above the band specified by the exchange. This is likely to restrict trading activity and is taken as the event day. To test the impact of price limits on price discovery, we take into account the number of stocks that have continued to hit the upper price band on each of the days following the event day. The number of consecutive days of such occurrences is taken as price discovery delay. This is done across event window of (-10, +10) days.

Stock prices can hit the upper price band either because of performance that results in fundamental change in value perceived or due to price manipulation. The reason for upper price band hit is indistinguishable from the trade data. In order to understand the relationship between upper band price limit hits and stock returns we use event window of (-10, +10) days. We calculate the returns on the stock on the above days as per equation below:

$R_{st} = (Price_{st} / Price_{st-1}) - 1$ … (1)

The Abnormal Return (AR) for the stock is calculated as the excess of stock returns over the returns of Nifty 500 index for the day which is taken as the benchmark returns. Nifty 500 index covers 94% of the free float market capitalization and 73 different. Hence Nifty 500 returns capture the impact of all political and macroeconomic events affecting stock returns. The excess over Nifty 500 returns can be attributed to stock specific reasons. Thus the AR of the stock is calculated as below:

$AR_{st} = R_{st}$ - ((Closing value of Nifty 500_t / Closing value of Nifty 500_{t-1}) -1) … (2)

We calculate the Average Abnormal Return (AAR) of all the stock for given time t using the equation below

$$AAR_t = \frac{1}{n}\sum_{s=1}^{n} AR_{st} \quad \text{… (3)}$$

We also calculate the Cumulative Average abnormal return (CAAR) as the aggregate of AARt around the event period of (-10, +10).

4.2 Impact of price limits on trading activity

Both the volume of shares traded and number of trades for the day for each of the above stocks has been obtained from the website of the national stock exchange for the event period (-10,+10). The average volume of shares (AV) and the average number of trades (AT) across the above period is calculated as given below:

$$AV_t = \frac{1}{n}\sum_{s=1}^{n} \text{Volume}_{st} \quad \text{… (4)}$$

$$AT_t = \frac{1}{n}\sum_{s=1}^{n} \text{No. of Trades}_{st} \quad \text{… (5)}$$

It is expected that the volume of shares traded and the number of trades will fall if price limits deter stock price manipulation.

5. Results and discussions

The descriptive statistics for the event day, 10 days before and 10 days after the event day is given in table 1 below:

Table 1: Descriptive statistics of price, volume and trades

Statistic	Event - 10 days			Event day			Event - 10 days		
	LTP	Volume (Shares)	Total trades	LTP	Volume (Shares)	Total trades	LTP	Volume (Shares)	Total trades
Mean	41.51	250233.8	774.47	52.32	970369.7	2765.2	55.25	540006.8	1023.754
Minimum	0	0	0	0.15	1	1	0	0	0
Maximum	485.75	6120735	36984	528.8	24768364	49358	608.7	26262508	17216

From the above table it can be seen that there is a significant increase in the average price of the upper circuit band hitting stocks on the event day which is expected. However, 10 days after the event also the average price of stocks is higher than the event day prices which is indicative of delay in price discovery. The average volume of shares traded has fallen from the event day levels.

5.1 Impact of price limits on price discovery

Out of the 176 stocks that hit the upper price band, the delay in price discovery was found to be as follows:

Table 2: Evidence of delay in price discovery

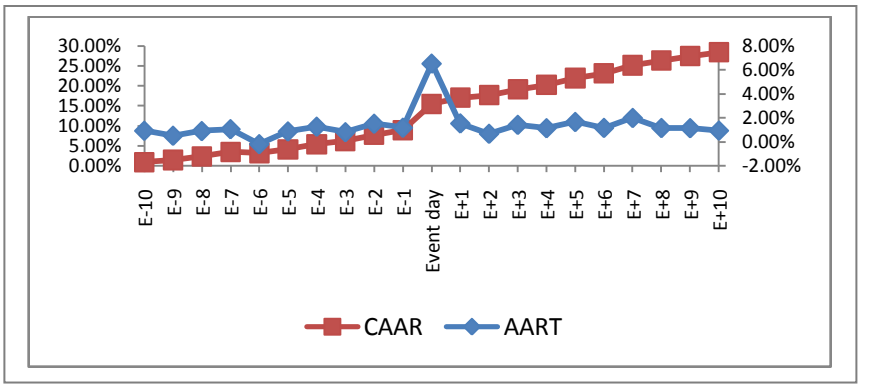
Days of delay	Number of stocks
2	16
3	2
4	3
5	3

Out of the total of 176 stocks delay in price discovery was found to prevail in 24 stocks which form 14% of the total sample. The delay in price discovery is limited to 2 days in majority of the stocks and beyond 2 days these stocks trade within the price bands applicable to them. Our findings are consistent with the findings of Kim and Rhee (1997).

5.2 Impact of Returns

The AAR and the CAAR graphs for the event period (-10, +10) are shown is Figure1.

Figure 1: AAR and CAAR of the stocks

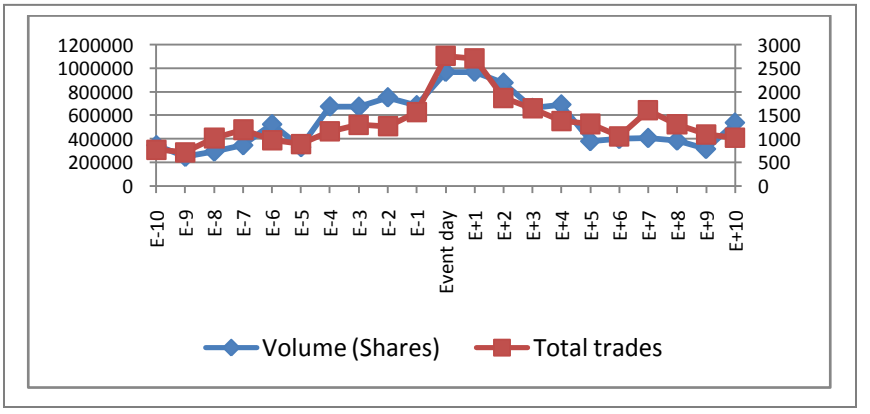


From the graph it can be seen that the AAR on the stocks increases drastically on the event day and on the subsequent day falls to levels as seen before. However, there is no evidence of reversal of returns after the event day as seen by CAAR curve. The prices of stocks continue to raise within the price limits specified by the exchange. Triggering of the upper price band may help in capping the profits or losses on a single trading day. Thus, fixing of price limits does not seem to curtail price increase in stocks hitting the upper price band. Hence, there is very little evidence to say that imposition of price limits help curtail price manipulation.

5.3 Impact of Trading Activity

The quantity of share traded and the number of trades for the pre and post event days are plotted on a line graph as shown in Figure 2.

Figure 2: Volume of shares and Total trades



From the figure, it can be seen that the total number of trades and volume of trades on the stocks, show a raising trend from upto 5 days before the event day. The volumes and number of trades remain high on the day subsequent to the event day and fall back to normal levels 5 days after the event day. Kim and Rhee (1997) also report extended high levels of trading activity post the event day. They conclude that price limits delay rational trading activity.

6. Conclusion and scope for further research

This study was conducted with the objective of assessing the impact of price limits on stock returns, trading volume and number of trades. Our analysis shows that price limits contribute to delay in price discovery. The level of trading activity in the stocks also does not reduce, after upper price band hits. Our results are consistent with the findings of others like Kim and Rhee (1997).

There is a fall in the abnormal average returns of the stock back to pre event levels on the subsequent day of the event day. However the uptrend in the prices of the stock is not reversed after stock hits upper price band. Price limits only help to curtail the single day momentum in price of stock and thereby control the profits and losses of single trading days. Imposition of price limits contributes to extending the trading activity across many days both in terms of price discovery and volume of trade and number of trades. As the cumulative average abnormal returns in the stocks continues to increase after the price band hit, it can be said that imposition of price bands by itself does not arrest price manipulation present if any. It is essential to look at price limits alongwith other measures like trade for trade, graded surveillance measures introduced by the exchanges to meaningfully conclude on whether they help curtail stock price manipulation.

It is felt that preserving market integrity and investor confidence is of supreme importance for efficient functioning of the markets and exchanges. Imposition of price limits contributes to delay in price discovery and thereby reduce market efficiency. However, as the volume of trade continues to be high, there is no evidence of market participants refraining from trading in the stock within the limits on the days subsequent to upper price limit hits. Hence, it is felt that the costs of such delay may not be significant. As price limits do serve the larger interest of risk management and preventing systemic failure of the markets, their benefits outweigh costs.

Future research in this area can look into upper and lower price band hits. A comparative study of price limit hits with other more stringent measures like transfer of stocks into trade to trade segment and graded surveillance measures, introduced by the exchanges in the recent past, can help is ascertaining the relative effectiveness of these methods on stock price manipulation.

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IMPACT OF QUARTERLY RESULTS ANNOUNCEMENT ON SHARE PRICE: EVIDENCE FROM INDIA

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R. Kasilingam

Abstract:

The study attempts to find out the effect of results announcement on share price. To know this impact paired sample T-test is employed. The analysis of variance is also used to find out whether there is any significant difference among the sectors in the price changes due to results announcement. This study analysed the results announcements by taking the IT, Banking, Telecom and Automobile sectors. The study finds that the results announcement have impact on change in share price. This impact is similar for all sectors. The study proves that results announcement relevance to share price fluctuation.

Key Words:

Result announcement, Share price fluctuation, Relevance

Introduction

Share price is influenced by many factors like demand and supply, Earning per Share and Price/Earnings Ratio. Quarterly results announcement is one of the important corporate actions that affect the share price. It is a significant part of disclosure on the financial statements which helps the investors and analysts to judge the performance of the company. The shareholders are the real owner of the

business and are interested to know the financial position of the business whether they should hold the shares of the company or sell the shares. Quarterly reporting is also very useful for the shareholders to take investment decision. The information about the relationship between quarterly results and share price movement will help the investors to take right investment decision. Therefore this study is carried to find out the impact of quarterly results on share price and also attempted to know whether such impact is same for each sectors or not.

Review of Literature

Abad D., Yague J. and Sanabria S., 2005, the paper examined the levels of stock liquidity, trading activity, volatility, and asymmetric information, as well as the order placement strategy around earnings disclosures. It is also analyzed the differences in the market reaction to announcements made during trading and non-trading hours. It is found that the stock liquidity and trading activity significantly improves after the announcement, although it is not found a significant reduction in the level of asymmetric information.

Amir E., and Livnat J., 2006, this study examined that absolute abnormal returns are higher the more detail is disclosed in the preliminary earnings release and that the level of detail is more strongly associated with unexpected returns when earnings surprises are extreme. It also found that market reactions to earnings surprises decline over time but increase with the level of financial statement detail in preliminary earnings releases.

Baber W.R. and Kang S. H., 2001, the study explains the consequences of earnings management by analyzing stock price reactions to on-target quarterly earnings announcements during 1993-1999. It is found that mean security returns during the earnings announcement period are 0.18% to 0.91% less for observations where firms apparently increase earnings than for those where firms apparently decrease earnings to meet expectations. These differences are statistically significant at conventional levels. It is also found that the returns during the earnings disclosure period vary inversely with the extent that firms appear to manage earnings upward. Overall, the evidence suggested that market participants are aware of incentives to manage earnings to meet expectations, and that they discount managed earnings components when interpreting quarterly earnings disclosures.

Pattanayak J. K., Pathak P., and Das S., 2008, the paper examines the return behavior of a sample of firms experiencing common type of event, for e.g., earning announcement, stock split, issue of new debt or equity, merger and acquisition and so on. The study also investigates the impact of quarterly earnings announcement on stock price movement of the firms. It is found that the quarterly earnings do not have pre return or post return effect on share price including market index BSE Sensex. It may be inferred that these announcement carry little information value for the investors.

Pyemo N. Afego 2011, the paper examined the stock market reaction to annual earnings information releases using data on the Nigerian Stock Exchange. Using the event study method, the speed of reaction of the market to annual earnings information releases for a total of 44 announcements from a sample of 16 firms listed on the exchange, for the period 2005 to 2008 is tested. Significant abnormal price reactions around earnings announcements suggest the earnings announcements contain value-

relevant information for the firms in the sample. The study found that the magnitude of the cumulative abnormal returns is dominated by significant reactions 20 days before the earnings release date, which suggests that a portion of the market reaction may be due to private acquisition and, possibly, abuse of information by insiders. The persistent downward drift of the cumulative abnormal returns, 20 days after the announcement, is inconsistent with the efficient market hypothesis, and therefore suggests that the Nigerian stock market does not efficiently adjust to earnings information for the sample firms within the study period.

Vieru M., 2003, the primary goal of this paper is to study whether the permanent price impact of large trades are greater before or after an interim earnings announcement in the Helsinki Stock Exchange. If the permanent price effects of large trades are greater before the announcement this would suggest that investors believe that some traders are better informed before the interim earnings announcement than after. Theoretical support is available that information asymmetry is greater prior to earnings announcements than after. Based on interim earnings releases, suggest that large trades do indeed produce greater permanent price effects before an announcement than after it. This suggests that large trades associated with price changes before an announcement send a stronger signal to other investors than similar trades after the announcement. For small trades the results were insignificant.

Research Methodology

The research designed for this study is descriptive in nature. The research is based on the secondary data. The Company's closing share price and Sensex index price for 9 days before and 9 days after the Quarterly announcement are collected from CMIE database. The sixteen companies are selected based on random sampling method from four different sectors such as IT sector, Banking sector, Automobile sector and Telecommunication sector. The period of the study is 28 quarters from 2009-2016. Abnormal return, cumulative abnormal returns techniques, paired sample t test and ANOVA techniques are used to analyze the impact of results announcement on the share price. Abnormal return is calculated by using market-adjusted model. The formula of market adjusted model is given below.

$AR_{jt} = R_{jt} - R_{mt}$

AR_{jt} = Abnormal return of a company j at time t,
R_{jt} = Observed daily return for the share of a company j at time t,
R_{mt} = Observed daily returns for the market index at time t.

Daily return of a company is calculated by using following formula.

$$\text{Daily return of a company} = \frac{P_{jt} - P_{j(t-1)}}{P_{j(t-1)}}$$

P_{jt} = Closing share price of a company j at time t,
$P_{j(t-1)}$ = Closing share price of a company j at time t-1

Same formula is also used for calculation of market return

$$\text{Daily market return} = \frac{P_{mt} - P_{m(t-1)}}{P_{m(t-1)}}$$

P_{mt} = Closing share price of the market at time t
$P_{m(t-1)}$ = Closing share price of the market at time t-1

Impact of Quarterly Results Announcement on Shareholders Wealth: Company Wise Analysis

Quarterly results declaration is a corporate announcement which is more often news for investors. This gives them an insight into company's performance. This also gives the guidance about the performance of the company in the forthcoming quarters. The information about profit earned and EPS is available in the results announcement which is the indicator of performance of company which is in turn used to buy or sell decision. The results announcement is the most important corporate action which may have impact on share price. To start with impact of results announcement of particular company on its share price is analysed.

Table 1: Company wise Analysis of AR and CAR before and after Announcement-IT Sector

Days	INFOSYS		WIPRO		HCL Technologies		TCS	
	Abnormal Returns	CAR	Abnormal Returns	CAR	Abnormal Returns	CAR	Abnormal Returns	CAR
-9	-0.519	-0.519	-1.182	-1.182	-0.153	-0.153	-0.742	-0.742
-8	-1.082	-1.601	1.675	0.493	-0.474	-0.627	1.417	0.675
-7	0.233	-1.368	0.818	1.310	-0.953	-1.580	-1.997	-1.321
-6	0.556	-0.812	-1.076	0.235	0.322	-1.257	-1.543	-2.864
-5	0.861	0.049	0.489	0.723	-0.150	-1.407	-0.263	-3.127
-4	0.912	0.961	-0.957	-0.234	1.391	-0.016	1.997	-1.130
-3	0.634	1.596	0.700	0.466	1.304	1.288	1.152	0.022
-2	0.263	1.859	-0.154	0.312	-0.935	0.353	-0.414	-0.392
-1	-0.137	1.722	-0.409	-0.097	0.616	0.969	0.717	0.325
0	3.492	5.214	-1.250	-1.347	-0.591	0.378	-0.167	0.159
1	-2.422	2.792	0.110	-1.237	-0.858	-0.480	1.372	1.530
2	0.995	3.787	-0.344	-1.581	-0.523	-1.003	0.179	1.709
3	-0.144	3.643	0.072	-1.509	0.274	-0.729	1.380	3.089
4	-0.453	3.190	-0.181	-1.690	-0.314	-1.043	1.946	5.035
5	-0.315	2.875	1.029	-0.661	-1.196	-2.239	0.571	5.606
6	0.084	2.959	-1.739	-2.400	-1.122	-3.362	-0.317	5.289
7	-0.229	2.730	-0.815	-3.215	-0.518	-3.879	-0.061	5.228
8	0.912	3.642	-0.574	-3.789	1.849	-2.030	0.413	5.642
9	0.288	3.930	1.451	-2.338	-0.356	-2.386	-0.150	5.491

Table 1 shows that the abnormal returns and cumulative abnormal returns of the share prices of the different IT companies such as Infosys, Wipro, TCS and HCL Technologies. On the announcement day, the abnormal return is positive and highest for Infosys with 3.492 percent. It is negative for WIPRO, HCL Technologies and TCS. The cumulative abnormal return is positive for INFOSYS, HCL Technologies and TCS with 5.214 percent, 0.378 percent and 0.159 respectively and it is negative for WIPRO with -1.347 percent. If the cumulative abnormal return is zero which means the market is behaving randomly and not influenced by any event. Here the CAR is not zero which means there is some kind of inefficient in the market. It may be weak or strong. At the same time CAR is not significantly high which means the market has not produced significant return due to price change. After the announcement, in the long run, INFOSYS and WIPRO give positive abnormal returns of 0.288 percent and 1.451 percent respectively and HCL Technologies and TCS give negative abnormal returns of -0.356 percent and -0.150 percent respectively. In the short run, the Infosys and TCS have positive abnormal returns with 0.995 percent and 0.179 percent respectively while HCL Technologies and WIPRO have negative abnormal returns with -0.523 percent and -0.344 percent respectively.

Table 2: Company wise Analysis of AR and CAR before and after Announcement-Banking Sector

Days	Indian Overseas Bank		HDFC Bank		Indian Bank		Canara Bank	
	Abnormal Returns	CAR	Abnormal Returns	CAR	Abnormal Returns	CAR	Abnormal Returns	CAR
-9	-0.630	-0.630	0.071	0.071	-1.165	-1.165	0.059	0.059
-8	0.344	-0.286	0.501	0.572	0.065	-1.100	-2.057	-1.998
-7	-0.548	-0.833	-0.961	-0.388	0.394	-0.706	-1.234	-3.231
-6	-1.013	-1.847	-0.608	-0.996	-1.775	-2.481	0.635	-2.597
-5	-0.071	-1.918	-0.128	-1.125	1.007	-1.474	0.184	-2.413
-4	-1.501	-3.418	0.501	-0.624	0.280	-1.194	-0.046	-2.459
-3	1.188	-2.230	0.619	-0.005	0.313	-0.881	0.814	-1.645
-2	-1.437	-3.667	-3.755	-3.760	-1.732	-2.614	1.984	0.340
-1	-0.376	-4.043	0.393	-3.367	-1.832	-4.446	0.421	0.760
0	-3.694	-7.737	0.888	-2.479	-1.249	-5.695	-1.144	-0.384
1	-1.280	-9.017	0.323	-2.156	-0.542	-6.237	0.704	0.321
2	-0.166	-9.182	-0.259	-2.415	-0.497	-6.733	-0.134	0.187
3	-1.605	-10.787	0.258	-2.157	-0.951	-7.684	0.050	0.237
4	1.449	-9.339	-0.122	-2.278	-0.678	-8.362	-0.742	-0.505
5	-0.781	-10.119	-0.842	-3.120	0.940	-7.422	-0.811	-1.316
6	-0.421	-10.540	-0.674	-3.794	1.390	-6.032	1.131	-0.185
7	-0.451	-10.991	1.138	-2.656	0.335	-5.697	0.870	0.685
8	0.376	-10.615	1.337	-1.318	-0.871	-6.568	1.506	2.191
9	-0.476	-11.091	-0.667	-1.986	-0.962	-7.530	-1.388	0.803

Table 2 reveals the abnormal returns and cumulative abnormal returns of the share prices of the different banks. The abnormal return on the announcement date of

quarterly results is positive for HDFC bank with 0.888 percent and it is negative for Indian Overseas Bank, Indian bank and Canara Bank with -3.694 percent, -1.249 percent and -1.144 percent respectively. The Cumulative abnormal return on the base date is also negative for all companies. After the announcement the abnormal returns is negative for all companies in both long run and short run. However the cumulative abnormal return shows highest negative value of -11.091 for Indian Overseas Bank and followed by -7.530 for Indian Bank. This indicates that the quarterly results have more negative impact on Indian Overseas Bank's share price and Indian Bank's share price.

Table 3: AR and CAR before and after Announcement for Automobile Sector

Days	TVS Motors		Tata Motors		Hero Motors		Ashok Leyland	
	Abnormal Returns	CAR	Abnormal Returns	CAR	Abnormal Returns	CAR	Abnormal Returns	CAR
-9	-0.325	-0.325	0.586	0.586	-0.547	-0.547	1.954	1.954
-8	0.514	0.189	0.093	0.679	-0.544	-1.091	0.925	2.878
-7	2.594	2.783	-0.987	-0.308	0.339	-0.752	0.826	3.704
-6	-0.880	1.902	-0.532	-0.840	0.568	-0.184	1.882	5.587
-5	-0.552	1.351	-0.913	-1.753	0.934	0.750	-0.009	5.577
-4	1.191	2.541	0.718	-1.035	0.225	0.975	-0.490	5.087
-3	-0.100	2.441	-0.871	-1.906	-0.156	0.819	0.449	5.536
-2	1.232	3.674	-0.818	-2.724	0.052	0.871	1.627	7.163
-1	0.586	4.260	-1.039	-3.763	0.943	1.814	-0.601	6.562
0	-2.010	2.250	0.812	-2.951	-0.697	1.117	-2.014	4.548
1	-3.580	-1.329	1.369	-1.581	-0.675	0.442	4.620	9.168
2	-1.225	-2.554	0.385	-1.196	0.152	0.594	-0.575	8.593
3	-0.356	-2.910	-1.099	-2.295	0.972	1.566	-0.188	8.405
4	-0.694	-3.604	-0.758	-3.053	-0.552	1.015	1.372	9.777
5	2.840	-0.764	0.236	-2.817	-0.352	0.663	-2.222	7.554
6	0.249	-0.515	0.219	-2.598	0.184	0.847	-0.366	7.188
7	1.318	0.803	-0.076	-2.674	0.157	1.004	0.337	7.525
8	0.268	1.071	0.451	-2.223	0.013	1.017	0.891	8.416
9	-0.073	0.998	-0.637	-2.860	0.957	1.974	0.415	8.831

Table 3 shows that abnormal returns and cumulative abnormal returns of different automobile companies. On the announcement date the abnormal returns is positive for Tata Motors with 0.812 percent and it is negative for TVS Motors, Hero Motors and Ashok Leyland with -2.010, -0.697 and -2.014 percents respectively. After the announcement the abnormal returns is positive for Ashok Leyland and Hero Motors with 0.957 percent and 0.415 percent and it is negative for TVS Motors and Tata Motors in long run and the abnormal returns is negative for all companies except Tata Motors in the short run. However the cumulative abnormal return is 8.831 percent for Ashok Leyland which indicates this company produce more the excess returns after the announcement. Therefore quarterly results announcements have impact on the shareholders wealth of this company.

Table 4: AR and CAR before and after Announcement for Telecom Sector

Days	Airtel		Reliance		Tata Communications		Gemini Communications Ltd.	
	Abnormal Returns	CAR	Abnormal Returns	CAR	Abnormal Returns	CAR	Abnormal Returns	CAR
-9	-0.780	-0.780	1.844	1.844	0.773	0.773	25.606	25.606
-8	0.112	-0.668	-0.911	0.933	-0.053	0.720	-20.032	5.574
-7	-0.049	-0.717	-1.592	-0.658	-1.317	-0.597	0.180	5.754
-6	0.365	-0.352	0.598	-0.060	0.388	-0.209	-1.760	3.994
-5	-0.455	-0.807	1.261	1.201	-1.434	-1.643	0.317	4.311
-4	0.721	-0.086	0.213	1.414	0.410	-1.233	-0.050	4.260
-3	-0.698	-0.784	0.093	1.507	0.968	-0.265	0.795	5.055
-2	0.833	0.048	0.265	1.771	0.534	0.270	0.448	5.503
-1	-0.727	-0.678	-1.590	0.182	-0.061	0.208	1.341	6.844
0	-0.281	-0.959	-2.004	-1.822	0.474	0.683	-1.346	5.498
1	0.006	-0.953	8.994	7.172	-3.366	-2.683	1.421	6.919
2	-1.170	-2.124	-12.690	-5.518	1.790	-0.893	-0.096	6.823
3	-0.136	-2.260	1.546	-3.972	-0.216	-1.109	1.623	8.447
4	0.638	-1.622	-1.926	-5.898	-1.431	-2.540	-0.724	7.723
5	0.061	-1.560	0.341	-5.557	-0.436	-2.976	0.607	8.329
6	-1.252	-2.813	-2.991	-8.548	0.225	-2.751	-1.778	6.551
7	-0.525	-3.338	0.184	-8.363	-0.662	-3.413	-1.266	5.285
8	0.777	-2.561	-0.079	-8.443	-0.145	-3.558	1.962	7.248
9	-0.086	-2.647	0.097	-8.346	0.906	-2.652	0.262	7.510

Table 4 states that abnormal returns and cumulative abnormal returns of different telecommunication companies. On the announcement day the abnormal returns is positive for Tata Communications with 0.474 percent and it is negative for Airtel, Reliance and Gemini Communications Ltd. with -0.281, -2.004 and -1.346 percents respectively. After announcement in the long run, the abnormal return is positive for Tata Communications and Gemini Communications Ltd with 0.097, 0.906 and 0.262 percents respectively and it is negative only for Airtel with -0.086 percent. In the short run the abnormal returns is positive for Tata Communications with 1.790 percent while abnormal returns is negative for Airtel, Reliance and Gemini Communications Ltd. However quantum of negative abnormal return of Reliance is more than other companies. Therefore it can be concluded that quarterly results announcements have huge negative impact on the shareholders wealth of this company.

Impact of Quarterly Results on Shareholders Wealth-A Compare Mean Analysis

The stock price is a relative and proportional value of a company's worth and only represents percentage changes in market capitalization at any given point in time. Any percentage changes in a stock price will results in an equal percentage change in a company's value. To have clear understanding on the impact of result announcement mean price (average share price) before and after the result announcement can be compared. For this purpose paired sample t-test is used.

Table 5: Impact of Results Announcement on Share Price for IT Companies and Ban

IT Companies	*T- Value*	*Sig. (2-tailed)*	*Bank*	*T-Value*	*Sig. (2-tailed)*
Wipro	*-9.881*	*.000*	*IOB*	*11.877*	*.000*
TCS	*-6.343*	*.000*	*Indian*	*25.133*	*.000*
Infosys	*-12.676*	*.000*	*HDFC*	*4.300*	*.003*
HCL	*6.316*	*.000*	*Canara*	*-1.218*	*.258*

Table 5 shows that the significance value for the Information Technology Sector companies is lesser than 0.05 percent which indicates that there is a significance difference exists between share prices, before and after the Quarterly announcement. So it can be said that quarterly results announcements influence share price of such IT companies. Similarly the significant value is less than 0.05 for all banks except Canara Bank which indicates that there is also a significance difference between shares prices of before and after the Quarterly announcements. In case of Canara Bank, the significant value is greater than 0.05 which means quarterly result announcements does not influence share price Canara Bank. Overall, it can be concluded that quarterly results announcements have significant impact on share price.

Table 6: Impact of Results Announcement on Share Price-Automobile and Telecom

Automobile Companies	***T-Value***	***Sig. (2-tailed)***	***Telecom Companies***	***T-Value***	***Sig. (2-tailed)***
TVS	*9.509*	*.000*	*Airtel*	*6.026*	*.000*
Tata	*2.491*	*.037*	*Reliance*	*5.725*	*.000*
Hero Motors	*1.391*	*.202*	*Tata*	*10.279*	*.000*
Ashok Leyland	*-3.935*	*.004*	*GCL*	*1.027*	*.335*

Table 6 shows that the significance value for the Automobile companies except Hero motors is lesser than 0.05 percent which indicates that there is a significance difference exists between share prices, before and after the Quarterly announcement. So it can be said that quarterly results announcements influence share price of such IT companies. In case of Hero motors, significant value is greater than 0.05 which states that quarterly results announcement don't influence their share price. Similarly the significant value is less than 0.05 for Telecommunication companies except GCL which indicates that there is also a significance difference between shares prices of before and after the Quarterly announcements. In case of GCL, the significant value is greater than 0.05 which means quarterly result announcements do not influence the share price of that company. Overall, it can be concluded that quarterly results announcements have significant impact on share price.

Impact of Quarterly Results Announcement on Shareholders Wealth: Sector Wise Analysis

After the company wise analysis, the sector wise overall analysis is considered to find out the overall impact of the results announcement on share price in a particular sector.

Days	Telecommunication Sector		I T Sector		Banking Sector		Automobile Sector	
	AR	CAR	AR	CAR	AR	CAR	AR	CAR
-9	0.501	0.501	-0.351	-0.351	-17.756	-9.909	-0.296	-0.296
-8	-0.433	0.068	-0.021	-0.372	0.165	-9.744	-0.264	-0.560
-7	-0.507	-0.439	-0.817	-1.189	-0.175	-9.919	0.099	-0.461
-6	0.099	-0.340	-0.654	-1.843	-0.293	-10.212	0.465	0.004
-5	-0.650	-0.989	0.196	-1.648	0.362	-9.850	0.728	0.732
-4	0.558	-0.431	1.523	-0.124	0.023	-9.827	0.399	1.131
-3	0.143	-0.288	0.791	0.667	0.018	-9.809	-0.044	1.087
-2	0.863	0.574	-0.136	0.531	-0.293	-10.102	0.000	1.088
-1	-0.525	0.049	0.407	0.938	0.146	-9.956	0.701	1.789
0	-0.007	0.042	0.624	1.562	-0.654	-10.610	-0.764	1.025
1	0.277	0.319	0.028	1.590	-0.850	-11.459	-0.508	0.517
2	-2.412	-2.092	0.618	2.208	0.437	-11.022	-0.593	-0.076
3	0.047	-2.045	0.834	3.043	0.248	-10.774	0.616	0.541
4	-0.551	-2.596	0.414	3.457	0.465	-10.309	-0.446	0.095
5	0.038	-2.558	0.055	3.512	-0.085	-10.395	0.051	0.146
6	-0.756	-3.314	-0.223	3.289	0.222	-10.173	0.363	0.508
7	-0.169	-3.483	-0.347	2.942	-0.189	-10.362	0.042	0.550
8	0.344	-3.139	0.835	3.777	0.069	-10.293	0.418	0.968
9	0.418	-2.721	2.226	6.003	-0.268	-10.560	0.492	1.461

Table 7 shows that the overall analysis of the abnormal returns and the cumulative abnormal returns of the share prices of Telecom, IT sectors, Banking and Automobile sectors. On the announcement day, the abnormal returns is positive for IT sector with 0.624 percent and negative for Telecom, Banking and Automobile sectors with -0.007, -0.654 and -0.764 percent respectively. In long run, there is a Positive abnormal return after the announcement for Telecom, IT and Automobile which states that quarterly results announcements have positive impact on shareholders wealth. However the cumulative abnormal return is highest negative for banking industries because this industry produces negative returns due to of heavy negative of quarterly results announcement while the cumulative abnormal return is highest positive for IT industry because this industry produces high returns due to the pressure of quarterly results announcement. Therefore it can be concluded that quarterly results announcement have some kind of impact on the shareholders wreaths.

Figure 1: Overall analysis of AR for different sectors

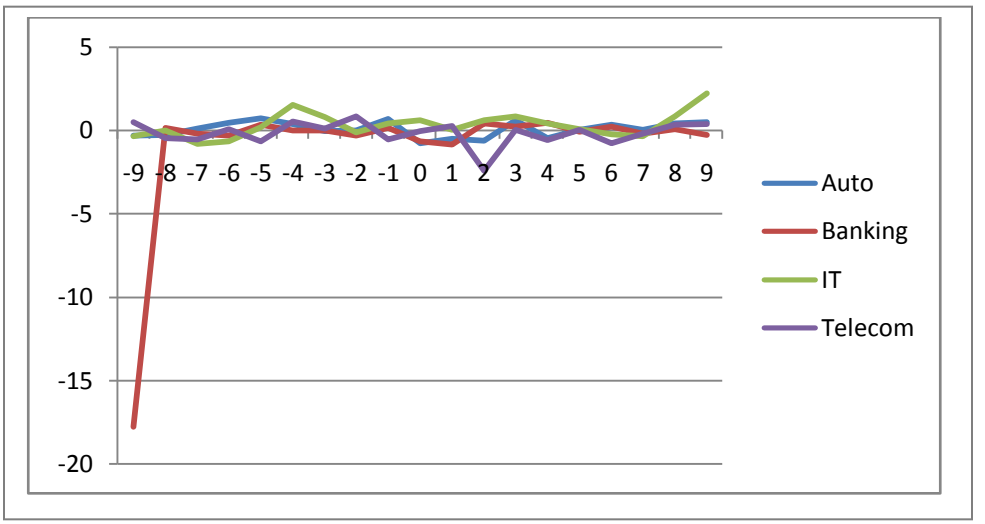

Figure 1 shows the overall analysis of abnormal returns of the share price in four different sectors for pre and post announcement period. It indicates that investors earn some excess or abnormal returns due to the results announcement. All sectors produce more returns in long runs. Therefore it can be concluded that quarterly results announcement have long term effect on shareholders wealth.

Sectoral Difference

Analysis of variance is used to find out whether there is any difference among the industries in the price change due to results announcement.

Table 8: Analysis of variance of different sectors

	Sum of Squares	*df*	*Mean Square*	*F*	*Sig.*
Between Groups	*6.501*	*3*	*2.167*	*.394*	*.757*
Within Groups	*1649.797*	*300*	*5.499*		
Total	*1656.298*	*303*			

Table 9 reveals that the significant value of .757 which is more than the 0.05. This means that there is no significant difference among different sector in share price change due to results announcement. Therefore it can be concluded that different industries do not have different behaviour because of quarterly results announcement.

Table 9: Event Window Analysis of Car

Days	Telecom	IT	Banking	Automobile
-9 to +9	-2.721	6.003	-10.560	1.461
-5 to +5	-2.218	5.355	-0.182	0.142
-2 to +2	0.331	1.541	-1.213	-1.163

Table 9 measures the impact of the quarterly results on shareholders wealth for different time periods. In the long run (-9 to +9), There is a positive impact on share price for IT and Automobile sectors while there is a negative impact on share price for Telecom and Banking sectors. In the short run (-2 to +2), the Telecom and IT sectors have positive impact while Banking and Automobile sectors have negative impact on the share prices. Therefore it can be concluded that IT industry has positive impact on share price in long run as well as in short run, Telecom industry has positive impact in short run and negative impact in long run and for automobile, it has positive impact in long run and negative impact on share price in short run. This study suggests that IT industry produce more abnormal returns after results announcement followed by Automobile industry. So investors may consider such industry for their construct the portfolio if they are going to invest for long period. If they are go for invest for short period they may buy the shares of Telecom and IT industries. As the our results shows the quarterly results announcement have negative impact for Banking industry, it should be analysed by bankers whether it is influenced by the results announcement or any other factors.

Conclusion

The study concludes that the abnormal return of many companies is a positive return after the announcement for both long run and short run. However, the sector wise analysis shows that the abnormal return of the share prices of all sectors is a positive after the results announcement in the long run only. It can be stated that there is a positive impact on share price but it may due to have results announcement. The paired sample t-test shows that there is a significant difference between the share price before and after announcement for all most companies. This can be inferred that the quarterly results announcement has impact on share prices. According to analysis of variance there is no significant difference in the return among different industries. The analysis shows that all industry produce same quantum of abnormal returns. Event window analysis concludes that IT industry produces more positive abnormal returns and banking industry produces returns. Hence the quarterly results announcements have impact on share price. So the investors and analyst should analyse share price movement after quarterly results for each and every company whether it is influenced by the results announcement or other factors while making the investment decision. Therefore it can be concluded that the results announcement is relevant to the investment decision.

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MONETARY VARIABLES AND STOCK MARKET RETURNS – THE INDIAN EXPERIENCE

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Abstract

There seem some astute annotations by economists and researchers on the causal relationship between monetary variables and performance of the equity markets. The foundation of this assertion refers to the flow of money supply and changes in interest rates and inflation that leads to the investment impact in equity markets. Indian economy is very much influenced by inflation and the monetary policies adopted by the Reserve Bank of India. There was a need to explore this policy impact on the Indian stock market, keeping in view the inflation factor also. This article aspires to identify the direction of causality between monetary variables such as money supply, consumer price index, call money rate and the performance of the Bombay Stock Exchange in VAR model. Impulse response function and variance decomposition analysis were employed to estimate the shock create by macro factors like money supply, interest rates and inflation on equity returns. There is a long-run relation exist between monetary variables and BSE Sensex. In the short run, however, there exists a unidirectional causality for consumer price index to performance of equity market. This implies that the inflation affects the movement of equity market in India in short-run. The paper restricted to only three macroeconomic variables although these are not the only macroeconomic factors which affect the stock prices in India.

Key Words:

Sensex, Money Supply, Cointegration, VECM, Granger Causality Test

1. Introduction

The discussion on monetary policies of any country and their impact on the stock market is always an interesting one because of many reasons. From the viewpoint of investors, they are always puzzled with the random movement of the stock prices and they ought to go for researchers to trace the reasons for these movements. From the policy maker's perspective, the response of equity price to Reserve Bank's policy is a key component for analysing the effects of monetary policy on the economy. Researchers and investors are much apprehended with the decision Reserve Bank of India takes to control supply of money and inflation in the economy. As one can easily identify the spill-over effect of money supply in the economy, if it is increase it leads to high inflation economy and vice versa. Thus, Reserve Bank changes interest rates to control money supply. Apparently, the three major monetary variables such as money supply, interest rates and inflation are inter-related and their movements affect the economy as well as stock market also. The prime objective of this paper is to corroborate the causal relation of these monetary variables such as money supply, inflation, interest rates with the stock market returns in India. Studies on these relationships also observed that monetary variables are influential factors on equity market returns but it differ from country to country and also vary seasonally. Though there are various other macroeconomic factors which affect the stock prices, however, we have restricted our paper to these select monetary variables only which are discussed above. The paper is designed as follows: after the brief introduction of the subject matter in section 1, discussions on select monetary variables and their assumptive relationship with stock price is presented in Section 2. Further, section 3 discusses about the data and the econometric methodology adopted for the study. Section 4 presents results of empirical studies in finding out the direction of causality among the variables. Summary and conclusions are presented in Section 5.

2. Variables selection and literature review

Generally, monetary policy instruments like money supply, interest rates and inflation are determined simultaneously as policymakers respond to macroeconomic fluctuations and intend their decisions to affect the economy. In this paper, we have used select monetary variables i.e. money supply (M3) and call money rate (CMR) and consumer price index which is proxy for inflation. Literature reviews have been done accordingly, taking each variable separately and finding out their causal relation with equity price based on past researches.

2.1 Money supply and stock price

Analysts considered the movement of money supply as one of the strong indicators of trend in monetary policy and interpreted as providing information about the movements of stock price in future. Analysing the past researches, we have observed that the study of Beryl Sprinkel in 1964 possibly one of the earliest studies to portray the relation between money supply and stock prices. Sprinkel (1964) used visual inspection of the data rather than any statistical techniques which does not give an exact estimation and conclusion. He observed a strong correlation between stock prices and money supply in the US during 1918 and 1960. This ground-breaking study was later followed by many researchers e.g. Keran (1971), Homa and Jaffe 1971), Mookerje (1987), Jeng, Butler and Liu (1990), or Malliaris and Urrutia (1991). Further studies of Davidson and

Froyen (1982); Pearce and Roley (1983); Mookerjee (1987) explored the long-term reaction of stock prices to movement in money supply. They conclude that money supply increase the liquidity in the market which leads to increase in the buying capacity of the securities that eventually results in upward movement of nominal equity prices.

Recent studies like Mukherjee and Naka (1995), Maysami et al. (2004), Ratanapakorn and Sharma (2007) also found positive relationship wheresas, results from Cagli, Halac and Taskin (2010) and Rahman et al. (2009) depicted different results which negate any co-integration between money supply and share prices. Based on these findings, we extent our studies in the Indian context and hypothesize that measures of money supply contain important information which effects the movement of stock prices in India. Therefore, we will explore how efficiently do stock prices react to the information contained in money supply changes in Indian economy?

2.2 Inflation and stock price

Fama (1981) in his proxy hypothesis confirmed that inflation and real activity are negatively related while real activity and real stock returns are positively related. Higher inflation leads to lower economic activities and consequently evidence of sluggishness found in the stock prices. Inflation here acts as a proxy for lower economic activities in near future and this line of reasoning is called the proxy effect or the proxy hypothesis, read Fisher (1930) and Friedman (1970) for more details on interest rates and inflation.

Inflation is an unpredictable factor which affects the share prices either positively or negatively. It may directly influence real stock prices (negatively) through unexpected changes in the price level (Humpe and Macmillan, 2007). It is said that an increase in inflation is negatively related to equity prices due to increase in cost of production (Naka et al. 1998), (Srivastava, 2010), (Ioannides, Katrakilidies and Lake, 2002). Kaul (1987) and Davis and Kutan (2003) concluded that inflation has weak predictive power on stock market volatility and returns whereas studies of Hamilton and Lin (1996), Engle (2004), Engle and Rangel (2005), Rizwan and Khan (2007), etc., established a strong predictive power of inflation on stock market volatility and returns.

2.3 Interest rates and stock price

Call money rate (CMR) is considered as a proxy of interest rate which has a negative relationship with stock prices. The rationale behind this can be explained in this way, that an increase in interest rates enhances the opportunity cost of holding money which causes the investors substituting stocks from interest bearing securities resulting in declining stock prices. Thus, a change in nominal interest rates should move asset prices in the opposite direction. Similarly, lower interest rates prompt investors to move money from the bond market to the equity market. Another view suggest that a negative relationship is partly based on the assumption that a decrease in interest rates leads to lower borrowing costs for firms, higher future profits, resulting in higher stock prices. Changes in the short term interest rate are mainly driven by the business cycle and monetary policy (Srivastava, 2010), (Tripathy, 2011).

3. Data and Methodology

3.1 Data

The paper investigates the causal relationship between stock market index and monetary variables in India considering 16 years monthly data from April, 1998 to March, 2014. Given the unavailability of a longer period and a lower frequency of data, the monthly data seems satisfactory for the intended empirical analysis. The data are taken after the period of financial sector reforms in India to avoid any major structural break in the data. Post reform period i.e. during 1995 when the reforms come to operate in full bloom, has witnessed abundant efforts to develop the security market by way of liberalising and proper regulative measures. Monetary indicators employed in the analysis include money supply (M3), call money rate (CMR) and consumer price index. In this paper Broad Money (M3) is considered as a proxy of money supply, similarly, call money rate as a proxy of interest rate and inflation rate is based on change in consumer price index. Broad Money (M3) is the sum total of Time deposit and Narrow Money (M1). Moreover, Narrow money (M1) includes Currency with the Public, other' Deposit with the RBI and Demand Deposits. Bombay Stock Exchange Sensitivity Index (Sensex) is taken as the proxy of the Indian stock market in this paper.

The data regarding monetary variables and Sensex are taken from the official website of Reserve Bank of India and Bombay Stock Exchange respectively. To arrive at the stationary variables needed in the VECM, all variables are converted into natural logarithms, and their first differences are taken (table-1). Table 2 provides the summary statistics for the variables in levels only.

Table - 1: Definition of variables		
LSX	*Natural logarithm of the Sensex*	*LogSensex$_t$*
LCMR	*Natural logarithm of Call money rates*	*Log CMR*
LM3	*Natural logarithm of money supply*	*Log M3*
*CPI**	*Change in the Consumer price index*	*Inflation rate*
DSX	*Monthly return on the Sensex*	*logSensex$_t$ - logSensex$_{t-1}$*
DCMR	*Monthly change in Call money rates*	*LCMR$_t$ - LCMR$_{t-1}$*
DM3	*Monthly growth rate of money supply*	*logM3$_t$ - logM3$_{t-1}$*
DCPI	*Monthly realised inflation rate*	*Inf$_t$ - Inf$_{t-1}$*
• *CPI is not converted into log as it is in percentage form*		

3.2 Methodology

This section deals with the discussion of the methodological issues for investigating the causal relation between monetary variables and stock market index. The paper deals with time-series data so the investigation of integration properties of data is quite indispensible, and for this, unit root test is done. Cointegration test is applied to know the existence of long-run equilibrium relationship among the variables under study, if they are found integrated of same order. The details of econometric settings on the aspects of unit root, cointegration test are discussed below.

Cointegration and VECM framework

Economic series seem to drift all over the place, however, they do not drift away from each other. If we formulate this statistically we come up with the cointegration model. Co-integration between time series suggests that two series may behave in a different way in the short-run, but will converge towards a common behaviour in the long-run (Barrett and Li, 2002). Testing for cointegration is necessary step to check the long-run equilibrium relationship among the variables used. According to Engle and Granger (1987), two I (1) series are said to be co-integrated if there exists some linear combination of the two which produces a stationary trend [I(0)]. If the series are cointegrated, then there exists a valid error correction representation of the data, in which the short-term dynamics of the variables in the system are influenced by the deviation from long-term equilibrium (Engle and Granger, 1987). Through error correction mechanism the characteristics of the dynamic relationship between the series can be further elaborated (Barrett and Li, 2002; Rapsomanikis et al., 2003). The sequence of the empirical analysis is as follows: the empirical study starts with the cross-correlation analysis which is an easy and fast way to show the linear relation among the variables. Moreover, the formal investigation has started with examining the stationarity of the variables used in the analysis to find their order of integration. We have used Augmented Dickey Fuller (ADF) Unit Root Test for this purpose and estimated the following equation with trend and intercept:

$$\Delta (Y_t) = \alpha + \beta t + \Upsilon (Y_{t-1}) + \delta_1 \Delta (Y_{t-1}) + \ldots\ldots\ldots + \delta_{p-1} \Delta (Y_{t-p+1}) + \epsilon_t \ldots\ldots\ldots (1)$$

Here, α is a constant, β is the coefficient of the trend term (t) and p is the lag order of the autoregressive process. Y_t denotes the endogenous variables (M3, interest rates, inflation and Sensex). Once the order of integration is determined the Johansen cointegration test is used to examine the long run equilibrium relationships among the variables. To determine both the long-run and short-run relationships between the Indian stock market and the monetary variables, this study has treated all the four variables as an endogenous series. For Johansen cointegration test, we formulate two statistics, Eigen value and trace statistic defined which are as follows:

Trace statistic: $\text{Trace} = -T \sum \text{Log} (1-\lambda^1_t) \ldots (2)$
$t = r+1, \ldots, p$
Where $\lambda^1_{r+1}, \ldots\ldots, \lambda^1_p$ are (p-r) no. of estimated eigen values.

Maximum Eigen value statistic: $\lambda_{max} (r, r+1) = -T \log (1-\lambda^1_{r+1}) \ldots\ldots\ldots (3)$

If the absolute value of the computed trace statistic is greater than its critical value, then we reject our null hypothesis of no cointegration and claim that there exists at least one-way cointegration relation between the variables at 5% level of significance. Again we apply the same logic for the Eigen value as well. Once the number of cointegrated equations is found in cointegration test, we apply the VAR model to capture both the dynamic and interdependent relationships of the variables under study. When the variables of a VAR are cointegrated, we use a vector error-correction (VEC) Model. For the VEC model, the appropriate lag length is required which was selected based on Akaike Information Criterion (AIC) and Final prediction Error.

VEC Granger Causality test

The properties of a co-integrated series also imply the existence of a causal relation, as defined by Granger (Granger, 1969; 1980) that can be tested by assessing if the past observations of one of the two prices predict those of the other. In a VECM, short-term causal relations are denoted by changes in other differenced explanatory variables. The long-term relationship is implied by the level of disequilibrium in the cointegration relationship, i.e., the lagged error correction term (ECT). Hence, the Vector Error Correction model is useful for detecting short- and long-term Granger causality tests (Granger, 1969). For each equation in the VEC Model, we employ short-term Granger causality to test whether endogenous variables can be treated as exogenous by the joint significance of the coefficients of each of the other lagged endogenous variables in that equation. The short term significance of sum of the each lagged explanatory variables can be exposed either through joint F or Wald x2 test. Besides, the long-term causality is implied by the significance of the t –tests of the lagged error correction term. However, the non-significance of both the t-statistics and joint F or Wald x2 tests in the Vector Error Correction Model indicates econometric exogeneity of the dependent variable. Ganger causality test based on error correction model (ECM) among all the variables can be expressed as follows:
Where, DSX, DM3, DCPI and DCMR are the variables already defined earlier, ECT is error correction, captured from the cointegration regression. Where U_{it} are the serially uncorrelated random error terms. To get a long run relation among the variables the coefficient of ECT should be statistically significant.

Impulse response function and variance decomposition analysis

Impulse response function (IRF) of a dynamic system is its output when presented with a brief input signal, called an impulse. More generally, an impulse response refers to the reaction of any dynamic system in response to some external change (Lu and Xin, 2010). In order to estimate the extent of shocks to certain market explained by other markets in the system, we have employed variance decomposition analysis also. Information from this analysis should provide some further evidence on the patterns of linkages amongst stock markets, as well as contribute to enhancing insights upon how markets react to system-wide shocks and see how these responses propagate over time. This forecast error can be accounted for by its own innovations and the innovations of other variables in the system. In a statistical sense, if a variable explains most of its own shock, then it does not allow variances of other variables to contribute to it being explained and is therefore said to be relatively exogenous. The study has used Eviews-8 to run all the statistical analysis.

4. Empirical Results and Discussions

4.1 Descriptive Statistics

To assess the distributional properties of equity prices and other monetary variables, descriptive statistics are reported in Table 2. All variables, except Sensex, exhibit positive skewness, which implies that their distributions have a long right tail. The kurtosis statistics of all data series differing from three, implying that series do not follow a normal distribution which is further established by Jarque-Bera test.

Table - 2: Descriptive statistics				
	LSENSEX	LM3	CPI	CMR
Mean	9.038554	10.25636	7.117865	6.728594
Std. Dev.	0.709644	0.727839	3.657800	2.035981
Skewness	-0.153868	0.048625	0.759310	0.145793
Kurtosis	1.385894	1.712573	3.283178	3.455775
Jarque-Bera	21.60031	13.33541	19.09118	2.342021
Probability	0.000020	0.001271	0.000072	0.310053
Observations	192	192	192	192

4.2 Cross-Correlation and Regression Analysis

Linear association among the variables has been checked through cross-correlation analysis which is given in table – 3. The results of this analysis show that there is a high positive correlation between money supply and stock prices and also moderate correlation with consumer price index. Even we can see the similar correlation between CPI and money supply also.

Table - 3: Correlation matrix				
	LCMR	LM3	CPI	LSENSEX
LCMR	1.000000	-0.086188	-0.049906	-0.062315
LM3	-0.086188	1.000000	**0.461158**	**0.924547**
CPI	-0.049906	0.461158	1.000000	**0.450029**
LSENSEX	-0.062315	0.924547	0.450029	1.000000

In order to verify the impact of past values of monetary variables on sensex, we have employed regression analysis considering all monetary variables as explanatory variables and BSE Sensex as dependent variable. To avoid the serial correlation problem in the regression model, we have taken log difference data in the regression analysis. As from the results of correlation analysis we have seen moderate correlation between CPI and money supply, thus, to evade multi-collinearity problem among the independent variables, we have first excluded CPI from the analysis and then observed that neither money supply nor interest rates impact stock price. Again, we have run the regression excluding money supply and the results shows that only CPI has an impact on stock prices. Finally, we have taken all the variables in the model and run the test. We have shown only the last test in the appendix in table 4, in which the results remain same, only consumer price index is statistically significant in explaining variation in the explained variable, BSE sensex. The absolute value of the estimated t-statistic is greater than 2. From the Durbin-Watson statistics which is near to 2, we can claim that there is no auto-correlation problem exists in the series.

Table - 4: Regression analysis Dependent Variable: DSENSEX, Method: Least Squares Sample: 1 192, Included observations: 192				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	0.010269	0.008683	1.182651	0.2384
DM3	-0.099115	0.544860	-0.181909	0.8559
DCPI	-0.012782	0.004941	-2.587091	0.0104
DCMR	0.003181	0.004304	0.738910	0.4609
R-squared	0.038480	Mean dependent var		0.009111
Adjusted R-squared	0.023136	S.D. dependent var		0.073527
S.E. of regression	0.072672	Akaike info criterion		-2.385115
Sum squared resid	0.992862	Schwarz criterion		-2.317251
Log likelihood	232.9711	Hannan-Quinn criter.		-2.357630
F-statistic	2.507891	Durbin-Watson stat		1.900779
Prob(F-statistic)	0.060277			

4.3 Unit root test and stationarity

Cointegration requires the variables to be integrated of the same order. Thus, we test the variables for unit root to verify their stationary. We have done through the augmented Dickey-Fuller test with a truncated lag of 10 which is taken by the software itself. The results of the ADF unit root test are reported in table – 5. From the results of the test, all the variables are found to be non-stationary i.e. having unit root at level. However, all the variables are stationary at first difference at 1% significant level. The series are integrated of order one i.e. 1(1) and have no deterministic trend. Since our variables are stationary at first differences, we can safely check our variables for long-run relationship.

Table - 5: Results of Unit Root Test Augmented Dickey Fuller Unit Root Test (Trend and Intercept)		
	ADF at level*	**ADF at 1st Difference****
Sensex	-2.128679	-13.68627
M3	-1.448569	-12.37395
CPI	-3.100962	-10.26808
CMR	-2.541788	-17.50333
Critical values		
1%	-4.007084	-4.006824
5%	-3.433651	-3.433525
10%	-3.140697	-3.140623
*Log data; ** log difference data		

4.4 Lag length criteria

A crucial aspect of empirical research based on the vector autoregressive (VAR) model is the choice of the lag order, since all inference in the VAR model is based on the correct model specification. The lag length determination is important as when the lag

length differs from its true value, the estimates of a VAR turn out to be inconsistent, so are the impulse response functions (Braun & Mittnik, 1993). To determine the appropriate lag structure in the VAR system, we have done VAR lag selection criteria using Eviews 8 and found that lag length is one in all the four criteria i.e Akaike Information Criteria, Schwarz information criterion Hannan-Quinn information criterion and Final prediction error which is given in table - 6.

Table - 6

VAR Lag Order Selection Criteria
Endogenous variables: LSENSEX LM3 LCMR CPI

Exogenous variables: C, Sample: 1 192, Included observations: 182

Lag	*LogL*	*LR*	*FPE*	*AIC*	*SC*	*HQ*
0	*-670.0130*	*NA*	*0.019356*	*7.406736*	*7.477154*	*7.435282*
1	***601.9853***	***2474.106***	***1.96e-08****	***-6.395442****	***-6.043354****	***-6.252711****
2	*616.5386*	*27.66742*	*1.99e-08*	*-6.379545*	*-5.745786*	*-6.122629*
3	*625.4189*	*16.49198*	*2.16e-08*	*-6.301307*	*-5.385876*	*-5.930205*
4	*636.3369*	*19.79622*	*2.28e-08*	*-6.245460*	*-5.048359*	*-5.760172*
5	*655.9896*	*34.77024**	*2.20e-08*	*-6.285600*	*-4.806828*	*-5.686127*
6	*663.3996*	*12.78421*	*2.42e-08*	*-6.191204*	*-4.430761*	*-5.477546*
7	*673.8026*	*17.49076*	*2.59e-08*	*-6.129698*	*-4.087584*	*-5.301855*
8	*683.4782*	*15.84252*	*2.79e-08*	*-6.060200*	*-3.736415*	*-5.118171*
9	*691.9466*	*13.49361*	*3.05e-08*	*-5.977435*	*-3.371979*	*-4.921221*
10	*705.8642*	*21.56461*	*3.15e-08*	*-5.954551*	*-3.067424*	*-4.784152*

** indicates lag order selected by the criterion*
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

4.5 Johansen test for cointegration

The unit root test reveals that all the variables are same order of integration (i.e., they are stationary in levels), thus, the cointegration test is applied using multivariate Johansen co-integration tests to analyse the long run relationship and co-movement among the variables under study. Table - 7 represents the results of Johansen cointegration tests for the 16 years period utilizing the monthly data of all the variables. Here, all the concerned variables are taken together to find out presence of any long run relationship among them. The optimal lag length chosen by AIC, SC, HQ and FPE is 1. However, both the test statistics claim that there exist at most 4 cointegrating equations among the concerned variables. Thus, the null hypothesis of no cointegration is strictly rejected at 5% level of significance, implying long-run cointegration among the variables.

The normalised cointegrating equations are:

D(Sensex) = 9.25D(M3)-0.034D(CPI)+0.34D(CMR)
(2.78) (-1.31) (11.66)

The values in the parenthesis represent the estimated t-statistics of the estimated slope coefficients. Money supply and the interest rate are the statistically significant variables affecting the dependent variable, Sensex returns. However, CPI turns out to be statistically insignificant. Now, we use the cointegrating equation and go for applying vector error correction model (VECM) to check the direction of causality in the short-run.

Table - 7: Result of Cointegration Test				
Sample (adjusted): 3 192, Included observations: 190 after adjustments				
Trend assumption: Linear deterministic trend				
Series: DM3 DSENSEX DCPI DCMR				
Lags interval (in first differences): 1 to 1, Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		*Trace*	*0.05*	
No. of CE(s)	*Eigenvalue*	*Statistic*	*Critical Value*	*Prob.***
*None **	*0.438723*	*342.6415*	*47.85613*	*0.0001*
*At most 1 **	*0.364291*	*232.9089*	*29.79707*	*0.0001*
*At most 2 **	*0.349626*	*146.8361*	*15.49471*	*0.0001*
*At most 3 **	*0.290088*	*65.09668*	*3.841466*	*0.0000*
Trace test indicates 4 cointegrating eqn(s) at the 0.05 level				
** denotes rejection of the hypothesis at the 0.05 level*				
***MacKinnon-Haug-Michelis (1999) p-values*				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized		*Max-Eigen*	*0.05*	
No. of CE(s)	*Eigenvalue*	*Statistic*	*Critical Value*	*Prob.***
*None **	*0.438723*	*109.7326*	*27.58434*	*0.0000*
*At most 1 **	*0.364291*	*86.07281*	*21.13162*	*0.0000*
*At most 2 **	*0.349626*	*81.73943*	*14.26460*	*0.0000*
*At most 3 **	*0.290088*	*65.09668*	*3.841466*	*0.0000*
Max-eigenvalue test indicates 4 cointegrating eqn(s) at the 0.05 level				
** denotes rejection of the hypothesis at the 0.05 level*				
***MacKinnon-Haug-Michelis (1999) p-values*				

4.6 Vector Error Correction Model

The Vector error correction model (VECM), which is also termed as restricted VAR, is applied in order to check the direction of causality among the concerned variables. It is generally incorporated when there prevails no such economic theory behind the empirical study as to which variable to be treated as the explained and which to be as

explanatory. In VAR model, all the endogenous variables are treated as the explained variables simultaneously. In this model, the monetary variables and BSE Sensex are chosen as the endogenous variables.

The optimum lag-length is chosen by the AIC and FPE criteria is 1 in the present study. Thus, in this context, for all the variables we consider one-period lagged values as the explanatory variable to predict the explained variable.

Table - 8 in appendix represents the estimated coefficients of the error correction terms (long run impact) and the lagged values of all the time series data (short run impacts). There is presence of 3 cointegrating equation among the variables. Hence, for each explained variable, there are 3 error correction terms. However, for D (Sensex), among the three coefficients of the error correction terms, two turned out to be statistically significant as well as negative. This implies that these error correction terms get adjusted to move towards the long run equilibrium. The speed of adjustment of error term is 43% (0.43*100) and 3.24% (0.0324*100) respectively. However, out of 4 lagged values, one period lagged value of D (Sensex) turned out to be statistically significant to explain variation in the explained variable. However, the overall model becomes statistically insignificant which is clear from the R-Squared and Adjusted R-Squared Statistics. The estimated VECM model can be written as:

D(DSENSEX) = **C(1)*(DSENSEX(-1)** - 0.340785819918*DCMR(-1) - 0.00607610067538) + C(2)*(DM3(-1) + 0.0148890701492*DCMR(-1) - 0.0127641300764) + **C(3)*(DCPI(-1)** + 3.85604904616*DCMR(-1) - 0.0225027004146) + **C(4)*D(DSENSEX(-1))** + C(5)*D(DM3(-1)) + C(6)*D(DCPI(-1)) + C(7)*D(DCMR(-1)) + C(8)

Table - 8: Vector Error Correction Estimates, Sample (adjusted): 3 192

Included observations: 190 after adjustments, Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	*CointEq1*	*CointEq2*	*CointEq3*	
DSENSEX(-1)	*1.000000*	*0.000000*	*0.000000*	
DM3(-1)	*0.000000*	*1.000000*	*0.000000*	
DCPI(-1)	*0.000000*	*0.000000*	*1.000000*	
DCMR(-1)	*-0.340786*	*0.014889*	*3.856049*	
	(0.02929)	*(0.00147)*	*(0.34857)*	
	[-11.6342]	*[10.1144]*	*[11.0624]*	
C	*-0.006076*	*-0.012764*	*-0.022503*	
Error Correction:	*D(DSENSEX)*	*D(DM3)*	*D(DCPI)*	*D(DCMR)*
CointEq1	*-0.437791*	*-0.038225*	*-5.400107*	*3.415272*
	(0.08047)	*(0.00980)*	*(1.06308)*	*(1.17184)*
	[-5.44054]	*[-3.89887]*	*[-5.07968]*	*[2.91446]*

CointEq2	*-1.362306*	*-1.000713*	*19.73529*	*-16.89714*
	(0.84821)	*(0.10335)*	*(11.2059)*	*(12.3523)*
	[-1.60609]	*[-9.68314]*	*[1.76116]*	*[-1.36794]*
CointEq3	*-0.032441*	*0.000162*	*-0.572791*	*0.027227*
	(0.00645)	*(0.00079)*	*(0.08527)*	*(0.09400)*
	[-5.02593]	*[0.20657]*	*[-6.71701]*	*[0.28966]*
D(DSENSEX(-1))	*-0.294618*	*0.015074*	*3.221375*	*-3.083793*
	(0.07017)	*(0.00855)*	*(0.92706)*	*(1.02190)*
	[-4.19847]	*[1.76308]*	*[3.47482]*	*[-3.01770]*
D(DM3(-1))	*0.297915*	*0.030602*	*-19.92602*	*-0.722084*
	(0.61323)	*(0.07472)*	*(8.10148)*	*(8.93028)*
	[0.48581]	*[0.40958]*	*[-2.45955]*	*[-0.08086]*
D(DCPI(-1))	*0.008954*	*-0.000318*	*0.089584*	*-0.016218*
	(0.00600)	*(0.00073)*	*(0.07927)*	*(0.08738)*
	[1.49216]	*[-0.43563]*	*[1.13007]*	*[-0.18560]*
D(DCMR(-1))	*-0.001927*	*0.000465*	*0.058685*	*0.086459*
	(0.00497)	*(0.00061)*	*(0.06563)*	*(0.07235)*
	[-0.38786]	*[0.76807]*	*[0.89415]*	*[1.19507]*
C	*0.000800*	*2.21E-05*	*-0.013648*	*-0.000257*
	(0.00594)	*(0.00072)*	*(0.07843)*	*(0.08646)*
	[0.13468]	*[0.03051]*	*[-0.17400]*	*[-0.00297]*
R-squared	*0.357975*	*0.494306*	*0.262267*	*0.630550*
Adj. R-squared	*0.333282*	*0.474856*	*0.233892*	*0.616340*
Sum sq. resids	*1.218743*	*0.018092*	*212.7131*	*258.4617*
S.E. equation	*0.081831*	*0.009970*	*1.081089*	*1.191687*
F-statistic	*14.49689*	*25.41449*	*9.243081*	*44.37486*
Log likelihood	*210.0761*	*610.0353*	*-280.3258*	*-298.8320*
Akaike AIC	*-2.127117*	*-6.337214*	*3.035008*	*3.229811*
Schwarz SC	*-1.990400*	*-6.200497*	*3.171725*	*3.366528*
Mean dependent	*0.000745*	*2.63E-05*	*-0.012263*	*0.000737*
S.D. dependent	*0.100219*	*0.013758*	*1.235141*	*1.923930*
Determinant resid covariance (dof adj.)		*9.62E-07*		
Determinant resid covariance		*8.10E-07*		
Log likelihood		*254.1427*		
Akaike information criterion		*-2.212028*		

In order to obtain p-values and to further confirm short run impact of the macroeconomic variables on the explained variable we will follow VECM equation and conduct Ordinary Least square Analysis at 95% confidence interval. The lagged value of Sensex is the only variable that is statistically significant to predict the present value of the dependent variable in the first model at 5% level of significance. Further, the Durbin-Watson test of autocorrelation reveals that the problem of autocorrelation is not serious as the value of the statistic is close to 2 (D-W statistic = 2.21).

Table: 9: Method: Least Squares, Sample (adjusted): 3 192				
Dependent Variable: D(DSENSEX), Included observations: 190 after adjustments				
D(DSENSEX) = C(1)*(DSENSEX(-1) - 0.340785819918*DCMR(-1) - 0.00607610067538) + C(2)*(DM3(-1) + 0.0148890701492*DCMR(-1) - 0.0127641300764) + C(3)*(DCPI(-1) + 3.85604904616*DCMR(-1) - 0.0225027004146) + C(4)*D(DSENSEX(-1)) + C(5)*D(DM3(-1)) + C(6) *D(DCPI(-1)) + C(7)*D(DCMR(-1)) + C(8)				
	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.437791	0.080468	-5.440538	0.0000
C(2)	-1.362306	0.848211	-1.606092	0.1100
C(3)	-0.032441	0.006455	-5.025930	0.0000
C(4)	-0.294618	0.070173	-4.198473	0.0000
C(5)	0.297915	0.613230	0.485813	0.6277
C(6)	0.008954	0.006000	1.492161	0.1374
C(7)	-0.001927	0.004968	-0.387861	0.6986
C(8)	0.000800	0.005937	0.134679	0.8930
R-squared	0.357975	Mean dependent var		0.000745
Adjusted R-squared	0.333282	S.D. dependent var		0.100219
S.E. of regression	0.081831	Akaike info criterion		-2.127117
Sum squared resid	1.218743	Schwarz criterion		-1.990400
Log likelihood	210.0761	Hannan-Quinn criter.		-2.071735
F-statistic	14.49689	Durbin-Watson stat		2.216676
Prob(F-statistic)	0.000000			

4.7 VEC Granger Causality/ Block Exogeneity Wald Tests

Table 11 provides the results of granger causality test based on VECM to identify the short-run causal relation between the stock market and monetary variables and to have an apparent inference of which variables exert influence over the others. The empirical results confirm a unidirectional short-run causality running from consumer price index to sensex.

Table - 10: VEC Granger Causality/Block Exogeneity Wald Tests			
Sample: 1 192, Included observations: 190			
Dependent variable: D(LSENSEX)			
Excluded	Chi-sq	df	Prob.
D(CPI)	8.942562	1	0.0028
D(LM3)	0.335876	1	0.5622
D(LCMR)	2.561644	1	0.1095
All	11.69085	3	0.0085
Dependent variable: D(CPI)			
Excluded	Chi-sq	df	Prob.

D(LSENSEX)	*0.001249*	*1*	*0.9718*
D(LM3)	*0.757684*	*1*	*0.3841*
D(LCMR)	*0.469524*	*1*	*0.4932*
All	*1.183327*	*3*	*0.7570*
Dependent variable: D(LM3)			
Excluded	*Chi-sq*	*df*	*Prob.*
D(LSENSEX)	*2.468483*	*1*	*0.1161*
D(CPI)	*1.160147*	*1*	*0.2814*
D(LCMR)	*0.017748*	*1*	*0.8940*
All	*3.058129*	*3*	*0.3827*
Dependent variable: D(LCMR)			
Excluded	*Chi-sq*	*df*	*Prob.*
D(LSENSEX)	*1.019912*	*1*	*0.3125*
D(CPI)	*0.179977*	*1*	*0.6714*
D(LM3)	*1.188739*	*1*	*0.2756*
All	*2.537879*	*3*	*0.4685*

4.8 Impulse Response Function

Figure – 1 shows the impulse responses of BSE Sensex for the period of ten months. The response of Sensex to its own shock is positive with an increasing trend. However, the largest effect is from consumer price index, where a positive shock forces market down for a longer period of time. Similar results have been reported by Fama and Shwert (1977), Fama (1981), Geske and Roll (1983), Chen et al. (1986), for the USA, Naka et al. (1998), Darrat and Mukherjee (1987) for India, Mukherjee and Naka (1995) for Japan. Sensex is responding in negative with respect to money supply. It is due to the facts that increase in money supply indirectly leads to inflation which is deterrent to equity market growth. Initially, shock from Call money rate (interest rates) does not impact the BSE Sensex but gradually it has positive effect in sensex after six months.

4.9 Variance Decomposition

Table 11 reports a decomposition of the forecast error variance of stock prices. The ordering is the same here. Not surprisingly, almost all of the variance is attributable to stock prices themselves. In the second month 90.86 % of the variability in the BSE Sensex fluctuations is explained by its own innovations. The proportion decreases for the following months (to 85.35 % after 3 months), while the disturbances of the CPI seem to explain a continuously larger percentage of the variability of BSE Sensex among other variable which is followed by money supply. The result suggests that in the process of short-run adjustment for the Indian stock market only Sensex is significant. This means that sensex are being adjusted each month dominantly by the influences of the market's own performance rather than monetary policy of the RBI. However, inflation has a significant impact in the performance of the Indian stock market.

Table - 11: Variance Decomposition of DSENSEX				
S.E.	DSENSEX	DM3	DCPI	DCMR
0.081831	100.0000	0.000000	0.000000	0.000000
0.091664	90.86502	1.969613	7.106868	0.058495
0.106817	85.35433	2.158550	12.31917	0.167947
0.117651	81.70889	2.970115	15.07563	0.245369
0.128346	79.87082	3.579283	16.23186	0.318033
0.137820	78.50597	4.012276	17.11189	0.369863
0.146823	77.50412	4.290309	17.79903	0.406546
0.155256	76.67240	4.510958	18.38283	0.433817
0.163280	76.00131	4.690247	18.85225	0.456188
0.170918	75.44509	4.841431	19.23859	0.474885

5. Summary and conclusions

This study adopts the cointegration and VECM approach to examine the causal relationship between stock market returns and monetary variables in the context of India. There exist very limited empirical on this kind of relationship focussing on monetary variables for emerging market economies like India. This paper concentrate on short-run as well as long-run causal relationships between equity prices and monetary variables such as money supply (M3), call money rate (CMR) and consumer price index (CPI) in India using 16 years monthly data from April 1998 to March 2014. The co-integration analysis indicates that there exists long-run relationship among these variables. Whereas the results of vector error correction model confirm that there does not exists short-run causal relationship between the variables. The result of Granger causality test indicates that there is a short-run causal relation between consumer price index and BSE sensex, though, the direction of causality is from consumer price index to sensex. The results derived from the impulse response function that a positive shock from consumer price index forces market down for a longer period of time. This implies that the inflation affects the movement of equity market in India in short-run. Sensex is responding in negative with respect to money supply. It is due to the facts that increase in money supply indirectly leads to inflation which is deterrent to equity market growth. Moreover, shock from call money rate (interest rates) does not impact sensex but gradually it has positive impact on sensex. This implies that sensex are being adjusted each month dominantly by the influences of the market's own performance rather than monetary policy of the RBI. However, inflation has a significant impact in the performance of the Indian stock market.

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Appendices

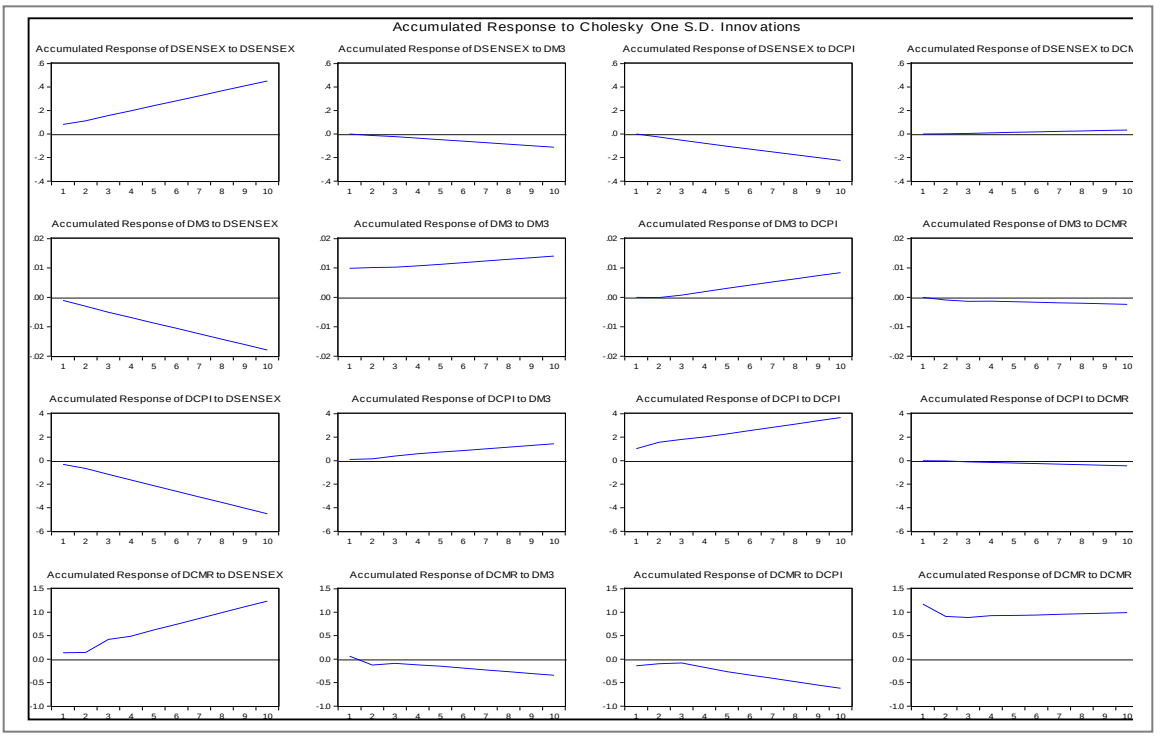
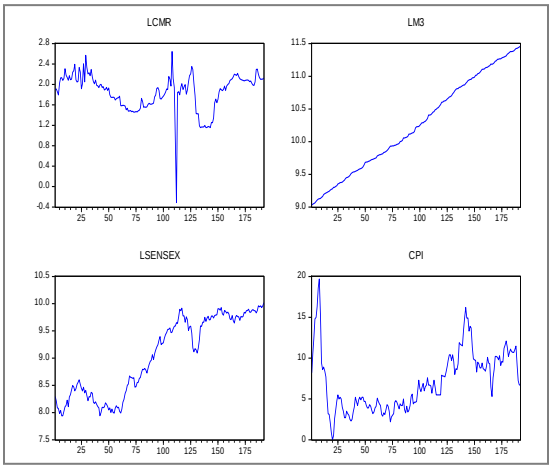
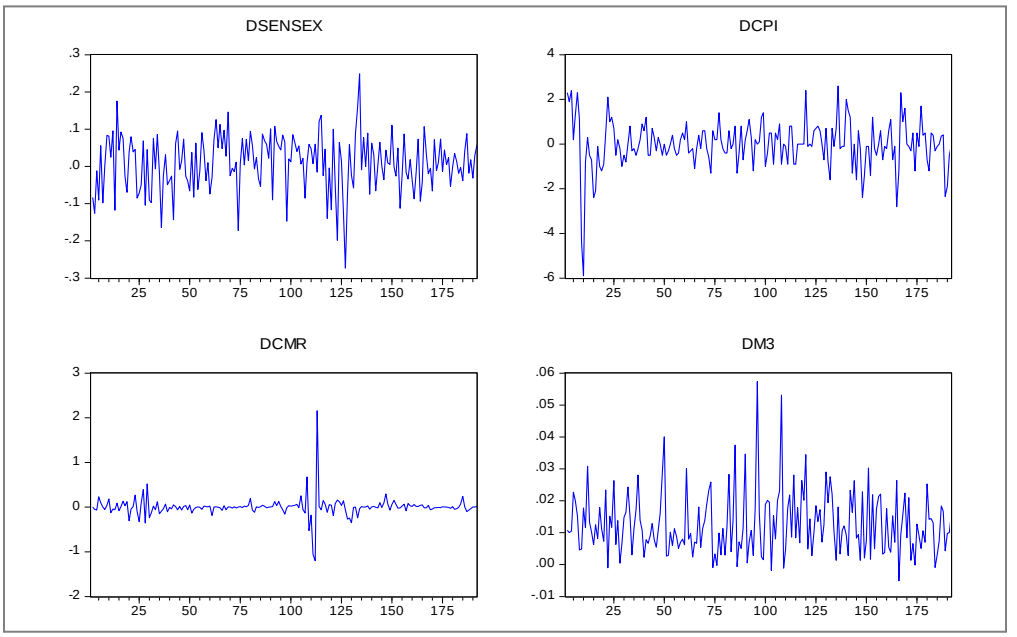


Figure – 1: Impulse response function

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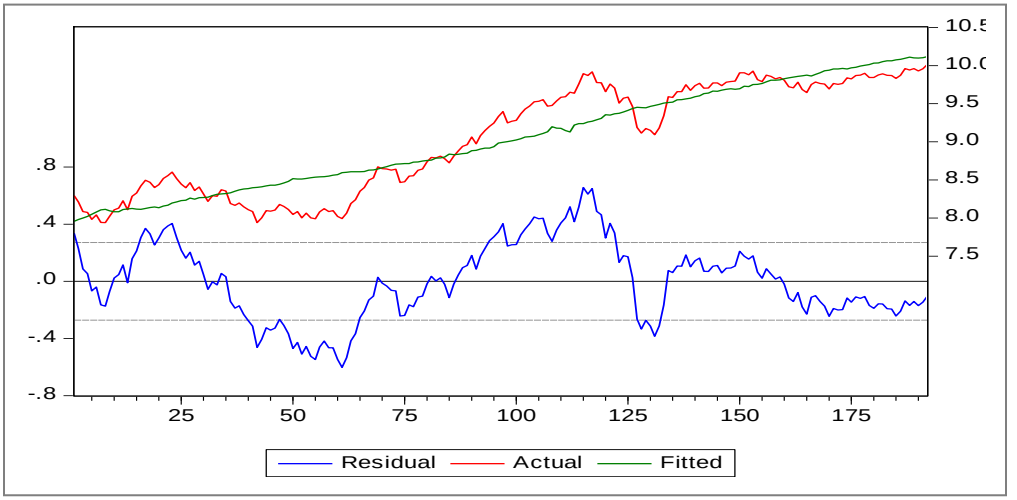
Residual
Actual
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MUTUAL FUNDS AS ANCHORS OF RISK: EVIDENCE FROM INDIAN EQUITY FUNDS

Kiran Kumar K V
P S V Balaji Rao

Abstract:

Market rationality argument claims that investors tend to choose portfolios such that their returns are maximized and risks minimized. Keeping aside the behavioral portfolios, mutual fund managers are incentivized on the excessive risk-adjusted returns generated. These calls for a discussion of what risk a mutual fund manager be working towards. There are two kinds of risks - systematic and unsystematic, the former being unmeasurable and latter diversifiable. This study using 29 funds as sample, aims to answer the question through empirical analysis of selected Indian mutual funds and their performance in terms of risk-adjusted excess return generation. The two risk parameters used in this study are standard deviation (CML) and beta (SML). A hypothesis for the difference in the mean excess returns is also conducted. It was concluded that, Indian asset managers are efficient in delivering a risk-adjusted return that is satisfying the risk premium demanded for the unsystematic risk assumed.

Key Words:

Mutual Funds, CML, SML, Modern Portfolio Theory

Introduction

Investors attempt to optimize in a particular manner as proposed by Harry Markowitz's *Modern portfolio theory*. And that manner is referred to by him as ***rationality***. According to the theory, rational behavior is warranted as investors are led to decide in uncertainty. Investors wanting to earn the maximum return are as rational as sun rising in the east. Since the return on a risky asset depends on values that various market and asset variables can take in future and the future is unknown, it becomes imperative that rational behavior of investor also considers risk of investing. A risky asset with higher expected volatility is bound to be under-preferred by the rational investor versus a risky asset with comparatively lesser expected volatility. The crux of efficient portfolio theory as per Markowitz, thus, becomes the ***efficient frontier***, essentially a Pareto line optimizing in two dimensions – expected return and the variance of such return (Markowitz H. M., 1990).Also, it can be noted that expected return is a desirable thing and variance of the return is an undesirable thing. (Markowitz H. , 1952)

Therefore, the process of portfolio building is, evidently, aiming to earn maximum possible return, while anchoring the risk parameter. Maximizing the anticipated return is a function of different variables estimated and used in the valuation process. Whereas, curbing the risk in the portfolio requires defining the risk in the first place. First, the asset class risk - that is hovering around the class of the asset as a whole; second, the security-specific risk – that's the sensitivity of the security's returns to changes in prices of the benchmark portfolio. The asset class risk can be brought down by diversifying across different classes of assets. Similarly, portfolio-specific risk can be reduced by different portfolios with directional movements that are divergent from each other.

The portfolio theory of Markowitz has well established that the security-specific risk can be brought down with ease by constructing a portfolio with an optimum proportion of a set of securities between whom the co-linearity is minimum. A mutual fund is supposed be a tool that can work in this direction, for an investor, who wishes to rely on the professional to take up the risk management task. Every mutual fund theoretically and practically is a diversified portfolio and supposed to be bringing down the volatility factor for the investor, as compared to a singular investment decision. And because, mutual funds take care of the security-specific risk, to a large extent, the risk that investors may have to focus would be the asset-class risk or the market risk.

It is well established that a rational investor would choose a combination of risk-free rate (defined as the rate in the absence of demand for any risk premium) and risk premium, through the seminal contributions of William Sharpe. Sharpe raised the question on the relationship between the risk and return of a portfolio and developed an asset pricing model that focused entirely on building a portfolio that minimized the difference between the marginal utility of investing in any security in a given portfolio. This was achieved by quantifying the assumed linear relationship between the expected returns on securities and their covariance with the market portfolio, viz., ***beta***. (Sharpe, 1990). The beta could be obtained by,

$$\boldsymbol{\beta_{im}} = \frac{C_{im}}{V_m} \qquad \text{.....Equation-1}$$

Where, β_{im} is the beta of the security or portfolio i, C_{im} is the covariance between the security or portfolio i and the market portfolio and V_m is the variance of the market portfolio. This was proliferated with the risk premium demanded by the investor to satisfy his utility function (which in turn depended on his risk appetite) and the combination of beta adjusted risk premium and the risk free rate became the expected return on a security or the portfolio.

By combining the efficient frontier and the expected return arguments, it could be inferred that market portfolio is supposed to be efficient and there exists a linear relationship between expected return and beta. And this becomes the strong argument in favor of mutual fund managers, theoretically speaking. Given that mutual funds are able to manage the unsystematic risk – as measured by their reduced variances of returns, are they also able to manage the systematic risk? Note that, there is no way one can target to reduce the systematic risk, but, the fund can deliver a return that is on par with the expected return of the investor (again, as measured by the investor's risk appetite).

Thus, this study aims to test if mutual funds in the Indian context, have been able to successfully generate a return that is in line with investor expectations. The kind of objective this paper attempts to achieve has few similarities with any existing literature. Most similar work is of Rao (Rao, 2014), where he attempted to understand the characteristics exhibited by the best performing mutual funds. His study was on 16 best performing Indian mutual funds, where he computed the annualized returns based on CML and SML, he concluded that fund returns relied heavily through their sensitivities on beta values than standard deviations. There are multiple other research works in the area of CML/SML/CAPM derivations. But, studies of this nature were rare to find.

Objective of the Study

The objective of this study is to investigate whether fund managers of Indian mutual funds are efficient in managing the total risk and the unsystematic risk. This problem statement becomes of pivotal importance when studied in the context of mutual fund investing community, as the very purpose of exposing oneself to mutual funds is to reduce the level of risk of investing in equity asset class.

Study Methodology

A sample of 35 Indian mutual funds were selected based on judgmental sampling. Judgmental as the funds were selected to capture almost all the fund houses in India (listed as per *Value Research Online* (Value Research Online, 2017). Also, diversified equity funds, multi-cap funds, large cap funds and high one year annualize return earned funds, in the pecking order were selected such that, there is a representation of one fund at least from each fund house. Due to availability of data and reliability study conducted, we could restrict our sample size to 29 funds. The list of funds with their one-year return (for the period of Jan-2016 to Dec-2016) and respective beta and standard deviation as reported are presented in the table below (Table-1): The data is collected directly from the reported fund factsheets published by each fund house in their websites' downloads section. The fact sheets of the month of December-2016 are used for the computational purposes. The data pertains to *REGULAR GROWTH* option of each fund. The annual returns are for the calendar year 2016, computed as the percentage growth in the NAV of the fund; standard deviation figures are annualized; andbeta values are

based on past three years of historical Net Asset Values. All the three information is collected from the fact sheets of the mutual fund houses.

Table-1: Sample Mutual Funds

SN	Fund Name	Annual Return (%)	Beta	Std. Deviation
1	Axis Equity Fund	-3.62%	1	14.70%
2	BOI Axa Equity Fund	1.30%	0.94	16.02%
3	Birla Sun Life Frontline Equity Fund	14.21%	1.02	14.92%
4	BNP Paribas Equity Fund	-4.36%	1.06	16.49%
5	Canara Robecco Equity Diversified	-1.97%	1.12	17.19%
6	DHFL Pramerica Largecap Fund	3.35%	0.9	15.27%
7	DSP Blackrock Equity Fund	4.06%	1.18	18.27%
8	Edelweiss Absolute Return Fund	-1.52%	0.5596	9.10%
9	Franklin India Bluechip Fund	6.45%	0.95	4.06%
10	HDFC Top 200	8.52%	1.176	5.30%
11	HSBC Equity Fund	8.02%	1.0377	4.52%
12	ICICI Prudential Top 100 Fund	10.27%	0.98	14.71%
13	IDBI India Top 100 Equity Fund	9.30%	0.9151	4.08%
14	IDFC Imperial Equity Fund	1.78%	0.95	13.89%
15	IIFL India GrowthFund	9.32%	0.93	5.23%
16	Indiabulls Bluechip Fund	4.93%	1.0067	4.63%
17	Invesco India Growth Fund	3.33%	0.97	4.32%
18	Kotak Classic Equity Fund	7.06%	0.93	13.84%
19	L&T Equity Fund	3.58%	1.05	15.71%
20	LIC MF Equity Fund	4.17%	1.0584	4.76%
21	Mirae Asset India Opportunities Fund	13.58%	0.98	15.25%
22	Motilal Oswal MOSt Focused 25	17.49%	0.86	14.01%
23	Parag Parikh Long Term Value Fund	3.28%	0.67	12.78%
24	Peerless Equity Fund	3.17%	0.83	12.79%
25	Principal Largecap Fund	4.48%	1.02	15.55%
26	Quantum Long Term Equity Fund	12.33%	0.99	15.09%
27	Reliance Top 200 Fund	10.52%	1.09	4.88%
28	SBI Magnum Equity Fund	14.09%	0.95	14.32%
29	UTI Top 100Fund	9.08%	0.88	14.20%

Source: Fund Fact Sheets as on Dec-2016of Respective Mutual Funds from the Fund House Websites

While the following section explains the procedure of analysis, it may be useful here to explain the theoretical background, namely the concepts of Capital Market Line and Security Market Line.

The analysis is carried out by following process:

Step-1: Computation of return on each of the sample mutual fund, assuming mutual fund managers (who are essentially the investors in this case) behave rationally, and thus, the fund returns fall on the *efficient frontier*. In other words, assuming mutual fund portfolios and the market index

portfolio are efficient portfolios, investing in any of this portfolio would provide a maximum return for the investors, while holding the risk at desirable level. This is computed using the Capital Market Line Equation:

$$E(R_j) = R_f + \lambda\sigma_j$$ Equation-2

Where, $E(R_j)$ is the expected return on efficient portfolio j, R_f is the risk-free rate, λ is the slope of the capital market line, and σ_j is the standard deviation of the portfolio j.

The slope of the Capital Market Line is obtained using the equation given by:

$$\lambda = \frac{E(R_M) - R_f}{\sigma_M}$$ Equation-3

Where, λ is the slope of the Capital Market Line, $E(R_M)$ is the expected return on market portfolio, R_f is the risk-free rate and σ_M is the standard deviation of the market portfolio returns.

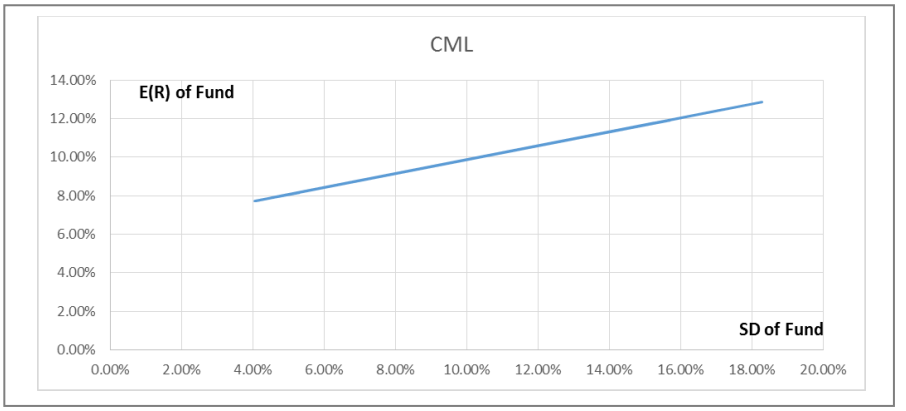
The same is presented in Table-2 below:

Table-2: Capital Market Line Return Computations

SN	Fund Name	Std. Deviation of the Fund	Std. Deviation of the Market**	Slope of CML	Expected Return on Portfolio
1	Axis Equity Fund	14.70%	16.59%	0.36	11.57%
2	BOI Axa Equity Fund	16.02%	16.59%	0.36	12.04%
3	Birla Sun Life Frontline Equity Fund	14.92%	16.59%	0.36	11.65%
4	BNP Paribas Equity Fund	16.49%	16.59%	0.36	12.21%
5	Canara Robecco Equity Diversified	17.19%	16.59%	0.36	12.47%
6	DHFL Pramerica Largecap Fund	15.27%	16.59%	0.36	11.77%
7	DSP Blackrock Equity Fund	18.27%	16.59%	0.36	12.86%
8	Edelweiss Absolute Return Fund	9.10%	16.59%	0.36	9.54%
9	Franklin India Bluechip Fund	4.06%	16.59%	0.36	7.72%
10	HDFC Top 200	5.30%	16.59%	0.36	8.17%
11	HSBC Equity Fund	4.52%	16.59%	0.36	7.88%
12	ICICI Prudential Top 100 Fund	14.71%	16.59%	0.36	11.57%
13	IDBI India Top 100 Equity Fund	4.08%	16.59%	0.36	7.73%
14	IDFC Imperial Equity Fund	13.89%	16.59%	0.36	11.27%
15	IIFL India GrowthFund	5.23%	16.59%	0.36	8.14%
16	Indiabulls Bluechip Fund	4.63%	16.59%	0.36	7.92%
17	Invesco India Growth Fund	4.32%	16.59%	0.36	7.81%
18	Kotak Classic Equity Fund	13.84%	16.59%	0.36	11.26%
19	L&T Equity Fund	15.71%	16.59%	0.36	11.93%
20	LIC MF Equity Fund	4.76%	16.59%	0.36	7.97%
21	Mirae Asset India Opportunities Fund	15.25%	16.59%	0.36	11.77%
22	Motilal Oswal MOSt Focused 25	14.01%	16.59%	0.36	11.32%
23	Parag Parikh Long Term Value Fund	12.78%	16.59%	0.36	10.87%
24	Peerless Equity Fund	12.79%	16.59%	0.36	10.88%
25	Principal Largecap Fund	15.55%	16.59%	0.36	11.87%
26	Quantum Long Term Equity Fund	15.09%	16.59%	0.36	11.71%
27	Reliance Top 200 Fund	4.88%	16.59%	0.36	8.01%
28	SBI Magnum Equity Fund	14.32%	16.59%	0.36	11.43%
29	UTI Top 100Fund	14.20%	16.59%	0.36	11.39%

**Risk-free Rate is assumed to be 6.25% **Market Risk Premium is assumed to be 6%*

For a better understanding of the behavior of funds with respect to their total risk management efficiency, we plot the above in a line graph to derive the capital market line. Note that these portfolio returns are conjunct their respective standard deviations:



An explanation on the inference of above table and the graph is given along with the inference of step no. 2 below:

Step-2: As the objective of the study is to see whether Indian mutual fund managers are efficient in managing the non-diversifiable risk, which is represented by the CML equation return as computed in table-2 above, it would also be necessary to compare the returns of those portfolios, which do not necessarily fall on the efficient frontier. The expected return and the standard deviation of such portfolios should be falling below the CML, as these are inefficient and not purposefully well-diversified. Such portfolios exhibit linear relationship between their expected returns and covariance with the market portfolio, but, need not give a conclusive pattern of such relation (Chandra, 2012). Such relationship will result in an expected return as given by:

$$\boldsymbol{E(R_i) = R_f + \beta_i \sigma_{iM}} \quad \text{.....Equation-4}$$

Where, $E(R_i)$is the expected return on inefficient portfolio i, R_f is the risk-free rate, β_i is the slope of the inefficient portfolio with that of the market portfolio (which is supposed to be efficient with B = 1) also called the slope of the Security Market Line (SML), and σ_{iM} is the covariance of the returns of inefficient portfolio and the efficient market portfolio. The β_i is computed by:

$$\boldsymbol{\beta_i = \frac{E(R_M) - R_f}{\sigma_M^2}} \quad \text{.....Equation-5}$$

Where, β_i is the slope of the SML, $E(R_M)$is the expected return on market portfolio *M*, R_f is the risk-free rate, σ_M^2 is the variance of the market portfolio *M*.

The table below (Table-3) presents the computation of SML return of each of the mutual fund portfolios, to determine the performance of the fund managers, assuming they are inefficiently diversifying the unsystematic risk. The table is followed by graphical presentation of the SML as well for

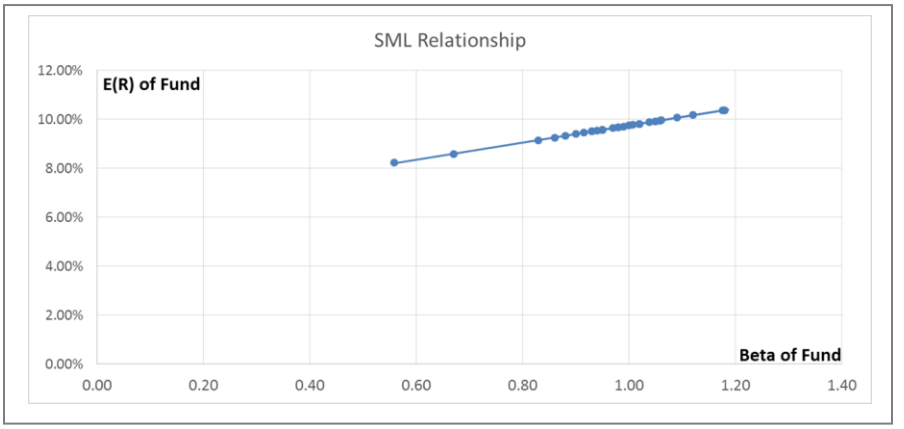
better understanding of the relation. Also note that expected returns of the same are defined along the lines of respective beta of the portfolio.

Table-3: Security Market Line Return Computations

SN	Fund Name	Beta of the Fund	Expected Return on Inefficient Portfolio**
1	Axis Equity Fund	1.00	12.25%
2	BOI Axa Equity Fund	0.94	11.89%
3	Birla Sun Life Frontline Equity Fund	1.02	12.37%
4	BNP Paribas Equity Fund	1.06	12.61%
5	Canara Robecco Equity Diversified	1.12	12.97%
6	DHFL Pramerica Largecap Fund	0.90	11.65%
7	DSP Blackrock Equity Fund	1.18	13.33%
8	Edelweiss Absolute Return Fund	0.56	9.61%
9	Franklin India Bluechip Fund	0.95	11.95%
10	HDFC Top 200	1.18	13.31%
11	HSBC Equity Fund	1.04	12.48%
12	ICICI Prudential Top 100 Fund	0.98	12.13%
13	IDBI India Top 100 Equity Fund	0.92	11.74%
14	IDFC Imperial Equity Fund	0.95	11.95%
15	IIFL India GrowthFund	0.93	11.83%
16	Indiabulls Bluechip Fund	1.01	12.29%
17	Invesco India Growth Fund	0.97	12.07%
18	Kotak Classic Equity Fund	0.93	11.83%
19	L&T Equity Fund	1.05	12.55%
20	LIC MF Equity Fund	1.06	12.60%
21	Mirae Asset India Opportunities Fund	0.98	12.13%
22	Motilal Oswal MOSt Focused 25	0.86	11.41%
23	Parag Parikh Long Term Value Fund	0.67	10.27%
24	Peerless Equity Fund	0.83	11.23%
25	Principal Largecap Fund	1.02	12.37%
26	Quantum Long Term Equity Fund	0.99	12.19%
27	Reliance Top 200 Fund	1.09	12.79%
28	SBI Magnum Equity Fund	0.95	11.95%
29	UTI Top 100Fund	0.88	11.53%

**Risk-free Rate is assumed to be 6.25% **Market Risk Premium is assumed at 6%*

The risk-free rate is assumed to be 6.25%, that is the 10 Year GOI Bond Yield and the market risk premium is assumed to be 6%. The applicable market risk premium in the period of study i.e., 2016, has been negative, due to the benchmark index return in itself lower than the risk-free rate, the same has been ignored. The assumption of 6% is based on the long term historical stock returns data.



Looking at the above graphs and relational tables, it can be clearly seen that beta values as well as standard deviation values provide equally convincing explanation for the portfolio return. Thus, it cannot be established that SML presents a better case for mutual fund performances in Indian scenario, than the standard deviation. It could lead us to infer that fund managers aim to optimize the return for given investment objective of the fund, while also attempting to bring down the overall volatility of the fund.

Presented below is the table (Table-4) summarizing the expected returns (of both CML and SML explanation) and the actual return of the funds:

Step-3: If the CML and SML were to determine fund manager behavior, there must exist a statistically significant difference in the mean values of returns between the two series of returns. We connote $\mu_{CML}$to represent the difference between fund's actual return and expected return based of firm's total risk (i.e., standard deviation) and μ_{SML} to represent the difference between fund's actual return and expected return based of firm's unsystematic risk (i.e., beta); Therefore, below hypothesis can be tested:

$$H_0: \mu_{CML} = \mu_{SML}$$

(*Null Hypothesis*: There is no statistically significant difference between the mean returns of mutual fund portfolios under CML and SML)

$$H_1: \mu_{CML} \neq \mu_{SML}$$

(Null Hypothesis: There is a statistically significant difference between the meanreturns of mutual fund portfolios under CML and SML)

The t-test for paired two sample for means is conducted and the results are presented below (Table-5)

Table-5: t-Test: Paired Two Sample for Means

	SML	*CML*
Mean	0.1204383	0.1043871
Variance	6.031E-05	0.0003259
Observations	29	29
Pearson Correlation	0.0221455	
Hypothesized Mean Difference	0	
df	28	
t Stat	4.4341229	
P(T<=t) one-tail	6.5E-05	
t Critical one-tail	1.7011309	
P(T<=t) two-tail	0.00013	
t Critical two-tail	2.0484071	

Package: MS-Excel 2013 (Data Analysis toolpack)

As the p-value of the t-test for hypothesized mean difference in two variables is less than 0.05 (alpha value for 95% level of confidence), we reject the null hypothesis that there is no statistically significant difference between the mean return given by total risk management efficiency and unsystematic risk management efficiency. Thus, ***we infer that there does exist a statistically significant difference in the mean return given by two approaches***. Combining the hypothesis test result with that of the graphical presentation before, we can induct that mutual fund managers are efficient in managing the unsystematic risk, which in any case, the proof of Markowitz's modern portfolio theory, and also we can conclude that fund managers can be more efficient than the market itself, based on the patterns established.

Conclusion

With the objective of testing whether Indian mutual fund managers are efficient in managing their respective portfolios such that benefits of diversification are delivered and also an excess return is generated to compensate for the asset-class risk assumed by the investor. The discussion on modern portfolio theory, asset pricing models and market efficiency gave the direction to design the testing process. The 29 Indian mutual funds those were selected have been used to determine the excess returns generated by them, over and above the expected returns. There were two such

approaches used. One, total risk was taken as a base to determine the expected return, with the assumption that investors, expect mutual funds to compensate with higher return for the total risk that they take. Capital Market Line equation was used for the same. Two, non-diversifiable risk was taken as a base to determine the expected return, with the assumption that investors are rational enough to understand that markets are so efficient that no investor could earn an excess return than the market. Hence, the expected return was arrived at by adjusting for the unsystematic risk assumed by the investor. Security Market Line equation served this purpose. We also tested the hypothesis for difference in the mean excess returns under two approaches, and concluded that there did exist a statistically significant difference between the two.

Thus, we conclude that Indian mutual fund managers are indeed managing the funds efficiently in terms of bringing down the overall risk of investing in equity securities for the retail investors to the extent of the unsystematic risk. This is a proof for the Markowitz's theory of diversification (Markowitz H. , 1952). From this study we did find that the fund managers are designing portfolios that can bring down the systemic risk (Total risk minus unsystematic risk), possibly with various other investing strategies ranging from value investing to contra investing.

It must also be noted that, in this study, there is a difference in the approach than using a commonly employed approach like Sharpe Ratio, which is useful in choosing a best portfolio amongst the alternatives (Rao, 2014). This study was more descriptive in nature that attempted to explain an existing phenomenon.

As the Indian mutual fund industry is doubling its AUM every five years and expected to reach INR 20 Trillion(The Economic Times, 2017) in the next few years, scientific attempts towards issues raised in this paper would be the need of the hour.

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SHARPE SINGLE INDEX MODEL: EVIDENCE FROM BOMBAY STOCK EXCHANGE (BSE) IN INDIA

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Abstract:

Risk and return plays a vital role in any investment decision. An investor often needs to make important decisions about whether to invest or not and in which securities or portfolio investment should be made. Sharpe Single index model can be useful in making such decisions. The main purpose of this study is to construct an efficient portfolio by using Sharpe single index model. For this purpose, monthly closing prices of top 20 BSE companies and BSE 100 index for the period from February 2012 to February 2017 have been considered. The proposed method calculates excess return to beta ratio and cut-off point, selects scrips with excess return to beta ratio higher than the cutoff point to form an optimal portfolio. The optimal portfolio consists of four stocks selected out of twenty stocks, giving the return of 2.56 percent. The findings of this study will be useful for individual as well as institutional investors, policymakers, fund managers etc.

Key Words:

Systematic Risk, Unsystematic Risk, Cut-off Rate, Beta, Excess Return To Beta Ratio

1. Introduction

In this fast paced and dynamic world, income from salary (or in some cases business) is not always sufficient to satisfy our consumption needs. The imbalances in earnings and consumption lead us to look for investment opportunities in various financial assets like stocks, bonds and debentures. Although, these investments are considered

to be profitable but at the same time it involves a great deal of risk. Since, the risk-return attitude[1] may vary from investor to investor; an investor must have some scientific as well as artistic skills to take an informed decision regarding his investments.

It's a very rare phenomenon that an investor will invest all his hard earned savings in a single security instead they tend to invest it into a group of securities which isknown as portfolio. By investing in a portfolio, an individual can reduce the risk without compromising on the return of the assets.

Portfolio management not onlyinvolves the analysis of individual securities but it also deals with the theories and practice of combining securities to construct an optimal and efficient portfolio. When an investor considers investing in securities, he is faced with the problem of choosing the securities from among a large number of securities available in the market and the amount of funds to be invested into each security. He has to make decisions like whether to invest into securities of a particular sector which is doing well based on the past performance and the future expectations or to invest into a different set of securities from different sectors based on his return expectations and the risk appetite. And once that's done, he is again faced with the problem of which securities to hold and how much to invest into each. He not only needs to take into account the return on each security but the risk associated with each security too. Thus, the aim of an investor is to construct an optimal portfolio taking into account the risk-return characteristics of all the securities.

Further, with time, the risk-return characteristics of the securities as well as that of portfolio changes. Hence, this calls for a periodic review and revision of the investor's portfolio. The portfolio management covers all the activities involved in the creation and management of the investment portfolio. It makes the investment activity more rewarding and less risky.

Portfolio management has now become a very common term and it's widely practiced in India. A number of factors like Information communication Technology (ICT), liberalization and globalization have contributed a lot to portfolio and investment management. One can now hold not only domestic securities but foreign securities too. The trading of futures and options has only added to the vast pool of alternatives of investment available these days to the investors. At the same time, with the increase in the number of financial assets and investments options available to the investors, it has not remained a simple process. It requires systematic, scientific and an analytical approach for the investor to earn huge returns by minimizing the risk and that is possible only through portfolio management and optimization.

Due to the volatile nature of the stock markets, stock exchanges all over the countries offer investors the opportunity to invest into portfolios whereby investors segment their total investment into a group of securities. It in turn saves investors from the volatility or risk prevalent in the stock markets. This study focuses on application of theoretical framework of portfolio management on a realworld scenario to form a well-balanced, optimized and diversified portfolio of stocks. The theoretical framework used in this study is the Sharpe-single index model given by William Sharpe

[1] *An investor can be risk loving, risk neutral or risk averse.*

in 1964.It is considered to be the best and simplified method of constructing the portfolios. In this article, 20 stocks from the BSE are considered to construct optimal portfolios with an assumption of no short sales. Further, BSE 100 index is used as a proxy for the market.

The paper is structured as follows. Section 2 provides a brief literature review. Section 3 firstly discusses the data used and then it presents the theoretical framework as well as methodology followed to construct the optimal portfolios. Section 4 presents the data analysis, empirical findings and the results. Finally, section 5 concludes.

2. Literature Review

Markowitz provided analytical tools for analysis and selection of optimal portfolio with his pioneering work in the area of portfolio management in 1952. He showed that an investor can reduce the risk by investing in a collection of securities rather than a single security. It was shown that if future returns and covariance matrix of share returns are available then it is possible to construct an optimal portfolio of risky securities.[2]

The work done by Markowitz was further extended by William Sharpe. Sharpe laid down a model known as single index model (SIM).This model made the complex computations easy to attain an optimal portfolio. The amount and type of input data required to perform calculations was also simplified. This model is considered to be the simplest and the most widely used one. It assumes that stocks vary together because of the common movement in the stock market and there are no effects beyond the market i.e. any fundamental factors effects that explain the co-movement between the stocks.

There have been many studies in the literature that have attempted to construct optimal portfolios using different approaches like Sharpe single index model, Treynor index, MAD, Markowitz model etc. We discussed here some of the studies that utilizes Sharpe single index model to construct optimal portfolios. Giri&Parhi (2017), Reni(2015), Gopalkrishna (2014), Sen & Fattawat (2014), Mandal (2013), Desai & Surti (2013), Debashish et al(2012), Andrade (2012), are some of the studies that utilizes Sharpe single index model to construct optimal portfolios.

Giri&Parhi (2017) reached an optimal portfolio of five stocks from a sample of fifty stocks actively traded on NSE. The data covers daily prices for a period of one year from January, 2015 to Dec,2015.Reni(2015) constructed an optimal portfolio of five banking stocks from a sample of thirty banking stocks of Indonesian stock exchange market. The period of study is from December 2013 to February 2014.Debasish et al (2012) arrived at an optimal portfolio of four stocks from the sample of fourteen NSE traded stocks from manufacturing sectors like automobiles, cement, paint, textiles etc. It applies Sharpe single index model on daily stock price data for the period from Jan 2003 to Nov, 2012 to construct optimal portfolio. Mandal (2013) applied Sharpe single index model to daily prices of twenty one securities from BSE. The optimal portfolio of ten securities was constructed from the data covering the period April 2001 to March 2011.The studies by Desai &Surti(2013) and Gopalkrishna (2014) attempted to construct an optimal portfolios from a sample of securities traded on NSE. However, the time period considered varies

[2] *Markowitz (1952) and Tobin (1958)*

for both the studies. Similarly, Sen&Fattawat (2014) and Andrade (2012) attempted to construct an optimal portfolio from a sample of securities traded on BSE and data covering a period of four and three years respectively.

Besides these studies, there are few studies that compared and discussed theadvantages of various approaches available to construct optimal portfolios. For instance, Elton, Gruber and Padberg (1976) suggested using single index model to avoid problems like difficulty in data input, educating portfolio managers and time-cost consideration. According to Haugen (1993), single index models can handle large population of stocks. They serve as simplified alternatives to the full-covariance approach to portfolio optimization. A study by Locke (2001) has tried to compare the optimization returns on the portfolios constructed using five different methods including Sharpe index model for the returns data from the five different countries including the longest data from the united states and the smallest from India. Briec&Kerstens (2009) stated that Markowitz model contributes in geometric mean optimization for long term investments while the SIM models are no longer good approximations to multi period. According to Terol et al. (2006),Markowitz model is a conventional model proposed to solve the portfolio selection problems by assuming that the situation of stock markets in the future can be characterized by the past asset data. However, they argued that it is difficult to ensure the accuracy of this assumption. Paudel (2006) studied data from Nepalese stock markets to found that the Markowitz mean variance uses a subjective approach and has a computational limitation. Majority of these studies point to one finding that Sharpe single index model approach is simple, useful and efficient in construction of optimal portfolios.

It is to be noted that all the above mentioned studies based on Indian stock marketsused the sample securities from either NSE or BSE. Some studies uses sector specific sample of securities while others chooses securities from different sectors. The frequency for prices used is daily, monthly or yearly. In addition, each study uses prices data of their respective periods. The stock markets are considered to be dynamic and constantly evolving. Hence there is a need for studies with the latest data to get accurate results. Our empirical study covering twenty sample securities traded on BSE and data for the latest period from Feb 2012 to Feb 2017 constitutes an important contribution to the literature on the above subject. It has practical importance for institutional as well as individual investors not only in terms of methodology and calculations done but also the results obtained for constructing and rebalancing of optimal portfolios.

3. Methodology and Data

3.1 Data

The secondary data from the BSE website has been used in this study. The BSE 100 market Index also called BSE National Index works as a broad based index and it represents the Indian stock markets at national level. Its monthly return data for the past 60 months i.e. from Feb 2012 to Feb 2017 has been used for calculating market return for the construction of diversified portfolios. The 100 companies listed on the Bombay Stock exchange which is the most important exchange of India constitute the population. All this data is taken from the BSE website. We have taken a sample of 20 securities that belong to sectors like Automobile, Oil and natural gas, Telecommunication, IT industry, FMCG, Banks etc. These securities are also a part of

100 stocks that constitutes the BSE 100 index. Besides that, the risk free rate is taken as rate on India's 10 year government bond. The monthly risk free rate is taken to be 0.6623 percent. Statistical tools i.e. Stata and Microsoft Excel are used to analyze the data.

3.2 Theoretical Framework & Methodology

We have used the Sharpe-single index model as our basic theoretical framework for constructing optimal portfolios.

The basic equation underlying the Sharpe single index model is given by:-

$$R_i = \alpha_i + \beta_i I + e_i \ldots\ldots\ldots\ldots\ldots (1)$$

Where:

R_i= Expected return on the security i
α_i= intercept of a straight line or alpha coefficient
β_i= slope of straight line or measure
I = Expected return on index (market)
e_i= error term with a mean of zero and a standard deviation which is a constant.

The two components of variance have been defined by Sharpe as follows:-

Systematic risk = β_iX Variance of the Market index

$$= \beta_i^2 \sigma_m^2 \quad \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Unsystematic Risk = Total risk – Systematic risk.

$$\sigma_{ei}^2 = \sigma_i^2 - \beta_i^2 \sigma_m^2 \quad \ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Sharpe simplified the construction of an optimal portfolio by measuring the desirability of including a stock in the optimal portfolio by a single number which is directly related to its excess return-to-beta ratio defined as follows:-

$$(R_i - R_f)/\beta_i \ldots\ldots\ldots\ldots\ldots\ldots (4)$$

Where:

R_i=expected return on stock i
R_f = Risk free rate of return
β_i = expected change in the rate of return on stock i associated with a 1 percent change in the market return.

If the stocks are ranked by excess return to beta ratio (highest to lowest), the ranking represents the desirability of any stocks inclusion in a portfolio. The number of stocks selected depends on a unique cutoff rate such that all stocks with higher ratios of $(R_i - R_f)/\beta_i$ will be included and all stocks with lower ratios excluded.

Steps involved:-

1) Firstly, for the market index and all the securities in the sample the average monthly return was calculated from the closing price data for a period of 60 months i.e. from Feb, 2012 to Feb, 2017.
2) For each security in the sample, the return on security was regressed[3] on the return on the market in order to calculate the values of beta and alpha. Also, the monthly variance and standard deviation was calculated for each security.
3) Then, securities with expected return greater than the risk free return and positive beta value were taken into consideration for constructing an optimal portfolio.
4) For all the securities selected in step 3, the systematic risk was calculated

[3] *We used Stata11 for running all the regressions.*

using the equation (2) and unsystematic risk was calculated by subtracting the systematic risk from the total risk of each security.

5) The excess return i.e. difference between the expected return and the risk free return was calculated for each security and then the ratio excess return is to beta was also calculated for each security.
6) After that the securities were ranked in descending order of excess return to beta ratio.
7) The number of stocks in the optimal portfolio was selected by calculating a cutoff point such that the securities with excess return to beta ratio above cutoff rate were included in the optimal portfolio and the ones with lower ratios were not included.
8) The cut-off point was calculated using the following formula:-

$$C_i = \sigma^2_m \sum_{i=1}^{m} \frac{(Ri - Rf)\beta_i}{1 + \sigma^2_m \sum \frac{\beta_i^2}{\sigma_{ei}^2}} \quad \text{..... (5)}$$

Where,

σ^2_m = variance of the market

σ^2_{ei} = variance of the security movement that is not associated with the market index i.e. stocks unsystematic risk.

R_i=expected return on stock i

R_f = Risk free rate of return

$ß_i$ = expected change in the rate of return on stock i associated with a 1 percent change in the market return.

9) Once the Cutoff point was determined ,the securities to be included in the optimal portfolio were identified easily using the concept that securities having excess return to beta ratio above the cutoff point are included in the optimum portfolio and rest were left. After that, the amount to be invested in each security was calculated using the following formulas:-

The percentage to be invested in each security:-

$$X_i = \frac{Z_i}{\sum_{i=1}^{N} Z_i} \quad \text{..... (6)}$$

Where,

$$Z_i = \frac{\beta_i}{\sigma_{ei}^2}\left(\left[\frac{R_i - R_f}{\beta_i}\right] - C^*\right) \quad \text{..... (7)}$$

The expression (6) basically scales the weights on each securities so that they sum to 1 i.e. full initial investment and the second expression (7) determines the relative investment in each securities.

10) Finally, the expected return, the variance and beta of the portfolio formed were calculated using the following equations:-

$$R_p = \sum_{i=1}^{N} R_i X_i \text{ .....(8)}$$

The portfolio variance was calculated using the following equation:-

$$\sigma_p^2 = \left(\sum_{i=1}^{N} X_i \beta_i\right)^2 \sigma_m^2 + \left(\sum_{i=1}^{N} X_i^2 \sigma_{ei}^2\right) \text{..... (9)}$$

$$ß_p = \sum_{i=1}^{N} \beta_i X_i \text{ ..... (10)}$$

Where,

R_p= Expected return of the portfolio

R_i= Expected return of the security i

N= total number of securities in the portfolio

X_i = proportion of portfolio devoted to security i

σ_p^2 = Variance of the portfolio formed

σ_{ei}^2 = Unsystematic risk of the security i

$ß_p$= Beta of the portfolio

β_i = Beta of the security i

4. Data Analysis and Results

Table 1 shows the sample of twenty stocks taken from the BSE along with their calculated mean returns and beta values.

Table 1: Sample of twenty securities

Stock Name	*Expected return (in %)*	*Beta*
TATA CONSULTANCY SERVICES LTD.	*1.4788*	*0.1058*
RELIANCE INDUSTRIES LTD.	*0.8957*	*0.8324*
HDFC Bank Ltd	*1.8640*	*1.0905*
BHARAT ELECTRONICS LTD.	*1.4674*	*1.5491*
ITC LTD.	*0.6526*	*0.4565*
OIL AND NATURAL GAS CORPORATION LTD.	*-0.1510*	*1.2298*
INFOSYS LTD.	*-0.5915*	*0.5078*
HOUSING DEVELOPMENT FINANCE CORP.LTD.	*1.2880*	*0.9075*
STATE BANK OF INDIA	*-0.8812*	*1.5572*
HINDUSTAN UNILEVER LTD.	*1.5357*	*0.5167*
MARUTI SUZUKI INDIA LTD.	*3.1123*	*1.7355*
COAL INDIA LTD.	*0.2556*	*0.9992*
INDIAN OIL CORPORATION LTD.	*1.0821*	*0.9246*
SUN PHARMACEUTICAL INDUSTRIES LTD.	*0.8525*	*0.3437*
ICICI BANK LTD.	*-0.2338*	*2.1188*
KOTAK MAHINDRA BANK LTD.	*1.2970*	*0.9921*
BHARTI AIRTEL LTD.	*0.3466*	*0.9054*
LARSEN & TOUBRO LTD.	*0.7385*	*1.7591*
TATA MOTORS LTD.	*1.5943*	*1.5416*
NTPC LTD.	*0.2070*	*0.9367*

Source: Authors calculation based on BSE data.

It can be seen from the Table 1 that Maruti Suzuki yielded the maximum return (3.11 percent) among the companies selected and SBI yielded lowest return of -0.881 percent. The returns on stock investment are negative for four companies and positive for the remaining sixteen. If an investor does not consider the risk aspect, then simply all investment could be made into the stock giving highest return i.e. MarutiSuzuki. But, it is important to note that it is also having a higher beta value of 1.74.Since beta is a measure of the systematic risk associated with stock returns and higher beta value signify that the volatility in stock return is high and thus not always desirable. This is where the concept of portfolio becomes important for achieving diversification. Although it is important to earn higher returns but one also needs to look into the risk involved while making investment decisions. Optimal portfolio helps in minimizing the risk without compromising on the returns. It can also be

seen from Table-1 that eight companies have beta values greater than 1.0[4] and the other beta values are less than 1.0[5]. ICICI bank ltd has the highest beta value of 2.11 signifying higher volatility than the market while TCS has lowest beta value of 0.1058 signifying lower volatility than the market.

Table 2: Ranking of the stocks based on Excess return to beta ratio

Stock Name	Excess Return (Ri-Rf)	Excess return/beta	Ranking
TATA CONSULTANCY SERVICES LTD.	0.8165	7.7198	1
RELIANCE INDUSTRIES LTD.	0.2334	0.2804	11
HDFC Bank Ltd	1.2017	1.1019	4
BHARAT ELECTRONICS LTD.	0.8051	0.5198	9
ITC LTD.	-0.0097	-0.0212	13
OIL AND NATURAL GAS CORPORATION LTD.	-0.8133	-0.6613	18
INFOSYS LTD.	-1.2538	-2.4692	20
HOUSING DEVELOPMENT FINANCE CORP. LTD.	0.6257	0.6895	5
STATE BANK OF INDIA	-1.5435	-0.9912	19
HINDUSTAN UNILEVER LTD.	0.8734	1.6903	2
MARUTI SUZUKI INDIA LTD.	2.4500	1.4117	3
COAL INDIA LTD.	-0.4067	-0.4070	15
INDIAN OIL CORPORATION LTD.	0.4198	0.4541	10
SUN PHARMACEUTICAL INDUSTRIES LTD.	0.1902	0.5535	8
ICICI BANK LTD.	-0.8961	-0.4229	16
KOTAK MAHINDRA BANK LTD.	0.6347	0.6398	6
BHARTI AIRTEL LTD.	-0.3157	-0.3487	14
LARSEN & TOUBRO LTD.	0.0762	0.0433	12
TATA MOTORS LTD.	0.9320	0.6046	7
NTPC LTD.	-0.4553	-0.4861	17

Source: Authors calculation based on BSE data.

Sharpe ratio measures the excess return generated over and above the risk-free rate per unit of additional risk taken. It provides a relationship between potential risk and reward. This concept of Sharpe ratio is useful while comparing two or more stocks. Forinstance, while comparing TCS and HUL, it implies that Tata consultancy services ltd. with an excess return-beta ratio of 7.72 will offer more return above risk-free rate for an additional unit of risk taken than Hindustan Unilever ltd. with an excess-return to beta ratio of 1.69.Hence, there is more desirability to include TCS in our optimal portfolio than HUL and hence TCS is ranked higher than HUL.It implies that higher the excess return to beta ratio, more is the

[4] *These are known as aggressive stocks which means that these stocks will shows more fluctuations in their returns as the return of BSE 100 index changes.*
[5] *These are known as defensive stocks.*

desirability to include the stock in the portfolio. Based on the excess return to beta ratio the scrip's are ranked from 1 to 20 in Table 2, with Tata consultancy Services Ltd. being in the first rank and Infosys Ltd. being in the last[6].

Table 3: Calculation of Cut off Values (Ci) for sample considered.

Stock Name	$(Ri-Rf)\beta/\sigma ei2$	$\beta^2_i/\sigma ei^2$	$\Sigma(Ri-Rf)\beta/\sigma ei^2$	$\Sigma\beta 2i/\sigma ei^2$	$\sigma^2_m*\Sigma(Ri-Rf)\beta/\sigma ei^2$	$1+\sigma^2_m*\Sigma\beta 2i/\sigma_{ei}^2$	Ci
TATA CONSULTANCY SERVICES LTD.	0.002154	0.000279	0.00215	0.00028	0.03832	1.00496	0.03813
HINDUSTAN UNILEVER LTD.	0.013503	0.007988	0.01566	0.00827	0.27857	1.14710	0.24285
MARUTI SUZUKI INDIA LTD.	0.111040	0.078658	0.12670	0.08693	2.25425	2.54663	0.88519
HDFC Bank Ltd	0.147642	0.133985	0.27434	0.22091	4.88118	4.93057	0.98998
HOUSING DEVELOPMENT FINANCE CORP.LTD.	0.026869	0.038969	0.30121	0.25988	5.35924	5.62393	0.95294
KOTAK MAHINDRA BANK LTD.	0.009769	0.015269	0.31098	0.27515	5.53306	5.89561	0.93850
TATA MOTORS LTD.	0.019462	0.032192	0.33044	0.30734	5.87934	6.46839	0.90893
SUN PHARMACEUTICAL INDUSTRIES LTD.	0.000763	0.001378	0.33120	0.30872	5.89291	6.49291	0.90759
BHARAT ELECTRONICS LTD.	0.007310	0.014065	0.33851	0.32278	6.02298	6.74316	0.89320
INDIAN OIL CORPORATION LTD.	0.003914	0.008619	0.34243	0.33140	6.09261	6.89651	0.88343
RELIANCE INDUSTRIES LTD.	0.006258	0.022323	0.34868	0.35373	6.20396	7.29370	0.85059
LARSEN & TOUBRO LTD.	0.002678	0.061791	0.35136	0.41552	6.25162	8.39312	0.74485

[6] TCS offers higher excess return over risk free rate(7.72%) for an additional unit of risk taken while ICICI offers less returnthan risk free rate(-0.42 %) for an additional unit of risk taken.

ITC LTD.	-0.000111	0.005219	0.35125	0.42074	6.24965	8.48598	0.73647
BHARTI AIRTEL LTD.	-0.005038	0.014449	0.34621	0.43519	6.16001	8.74307	0.70456
COAL INDIA LTD.	-0.010232	0.02514	0.33598	0.46033	5.97796	9.19038	0.65046
ICICI BANK LTD.	-0.017535	0.041463	0.31845	0.50179	5.66596	9.92811	0.57070
NTPC LTD.	-0.008884	0.018277	0.30956	0.52007	5.50789	10.25329	0.53718
OIL AND NATURAL GAS CORPORATION LTD.	-0.017659	0.026703	0.29190	0.54677	5.19369	10.72840	0.48411
STATE BANK OF INDIA	-0.014041	0.014165	0.27786	0.56093	4.94387	10.98044	0.45024
INFOSYS LTD.	-0.004250	0.001721	0.27361	0.56266	4.86824	11.01107	0.44212

Source: Authors calculation based on BSE data.

Table 3 shows the calculation of cutoff calculations for the securities arranged according to ranks determined in the Table 2. The C_i values goes on increasing from .038 to 0.9899 and thereafter starts declining. Therefore, the value of 0.9899 is considered as the 'cut-off point'. The securities which come after the cut-off point will not be considered for the optimal portfolio construction.

The existence of Cutoff rate makes the portfolio revision easier i.e. it can be easily decided whether to include a new security in the portfolio or not. If a security with excess return to beta ratio higher than the cutoff rate is there, one can easily say that it will be included in the optimal portfolio. The optimal Portfolio will need to be revised in order to know whether some old security need to go out of the portfolio or not but one can certainly tell whether new security will be a part of the optimal portfolio or not with the help of cutoff rate.

Table 4: Optimal portfolio

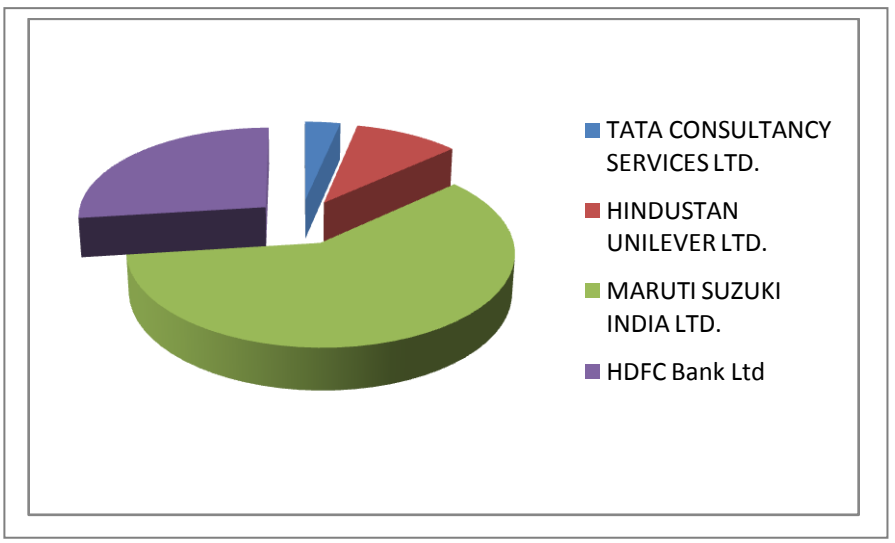
Stock name	[(Ri-Rf)/βi-C*]	$Zi = \beta^2_i/\sigma ei^2 * [(Ri-Rf)/\beta i-C^*]$	Xi=Zi/∑Zi	Xi (%)
TATA CONSULTANCY SERVICES LTD.	6.729784397	0.001877673	0.033747	3.374661
HINDUSTAN UNILEVER LTD.	0.70028586	0.005594183	0.100542	10.05418
MARUTI SUZUKI INDIA LTD.	0.421696163	0.033169799	0.596147	59.61465
HDFC Bank Ltd	0.111942726	0.014998691	0.269565	26.9565
		0.055640347		100
Portfolio Variance	48.72339			

Portfolio Standard Deviation	*6.980214*
Portfolio Beta	*1.38*
Portfolio Expected Return	*2.56*

Source: Authors calculation based on BSE data.

Table 4 represents the proportion of investment to be made in each security. ThefourSecurities ranking from 1 to 4 are selected for the optimal portfolio. The percentage of funds to be invested in each security is presented in Figure 1.It is found that majority of funds (i.e. 59.6 percent) should be invested in Maruti Suzuki India Ltd. followed by 26.9 percent in HDFC Bank Ltd., 10 percent in Hindustan Unilever ltd. and rest 3.3 percent in TCS ltd.

Figure 1: Proportion of investments in different securities



Source: Authors own construction.

We also calculated the mean return, beta and variance for our obtained optimal portfolio. It is found that expected return on the portfolio (2.56) is much higher than the expected return from market (1.02).However; the variance of the portfolio is higher than that of the market. In addition, the beta of the portfolio is 1.38 which is close to an aggressive level but still less than the beta of the most aggressive security in our portfolio (1.74). Hence, investor must constantly evaluate the

portfolio from time to time to minimize the risk without compromising on the return of portfolio.

It can also be followed that in our case with 20 securities, the Markowitz approach would have required 460 computational and data requirements while it is only 62 in case of Sharpe single index model. Hence, it can be stated that implementation of Markowitz model is much more time-consuming and more complex by the number of estimates required. Hence, the framework of Sharpe's single index model for construction of optimal portfolio is of practical value, very simple and useful.

5. Conclusion

Risk and return play a very significant role in investment science. An investor not only needs to look at return but also on risk characteristics of the stocks or portfolio while investing. This paper discusses the utility of Sharpe single index model to real world scenario of Indian stock markets and how it can be useful to both individual as well as institutional investors for making any investment decisions. Sharpe single index model is applied to monthly closing price data of BSE 100 index and 20 companies of BSE for the period from Feb,2012 to Feb, 2017.Out of the twenty samples of securities, only four are found to be qualified for the optimal portfolio. Further, it is noted that the optimized portfolio gives higher expected return as compared to market but at the same time has somewhat higher volatility and risk associated with it than the market. The beta of the portfolio is found to be 1.38 which is greater than 1.It implies that this kind of portfolio will be suitable for an investor who is risk lover. It is also important to note one of the important limitation of our study i.e. the results of this study are based ona historical price data for a period of 60 months i.e. Feb 2012 to Feb 2017.Hence, there is a constant need of portfolio evaluation and rebalancing in order to minimize the risk without compromising on the given expected return. Apart from the above findings, an investor should also take into account the other macroeconomic and economic factors while making final investment decisions.

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