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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.

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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Foreword

Greetings!!!

The year 2017 was manifested by a number of key structural initiatives to build strength across macro-economic parameters for sustainable growth in the future. The growth in the first half of the year suffered regardless of global tailwinds. However, the weakness seen at the beginning of 2017 seems to have bottomed out as 2018 set in. Currently, the economy seems to be on the path of recuperation, with indicators of industrial production, stock market index, auto sales and exports having shown some uptick. We believe that India's economic outlook remains promising for FY17-18 and is expected to strengthen further in FY18-19. However, the signs of green shoots should not be taken for granted as downside risks remain.

The biggest challenges for 2018 are as to how the economy can maintain its recovery in the face of escalating inflationary pressures, coupled with a higher fiscal deficit as well as an increasing debt burden. The key to this challenge lies in the resurgence of consumer demand and private investment.

The objective of this volume is to present articles on socio-economic issues like CSR, Financial Management, Securities Markets, etc. I am sure that this volume of research bulletin will provide the necessary insight to the readers on the diverse issues it has covered and will prove to be highly beneficial to the readers by enriching their knowledge base.

I extend my sincere appreciation for 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.

CMA Sanjay Gupta
President &
Chairman - IT & Research Committee
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Editor's Note

Greetings!!!

In the present scenario of cut-throat competition, both on price and quality, increasing consumer demands and product differentiation, the traditional costing system has become outdated and even have led to strategic failures in many organizations when various costs especially the overheads, are incorrectly allocated to product lines. Activity-based costing is a definite improvement over the traditional methods on the premise that the costs are collected on the basis of activities rather than products and it can effectively contribute to the managerial decision-making process.

The firms who have adopted ABC were significantly more successful in capturing accurate cost information for value chain and supply chain analysis in comparison with the firms who had not adopted ABC. The management motivation for adoption of activity-based costing is significantly higher in case of manufacturing sector firms vis-a-vis service sector firms only in case of product/service pricing decisions. The need for customer profitability analysis and budgeting led the corporate India to extend their ABC-systems from basic level to advanced level, extending it to facility level and customer level activities. The introduction of activity based costing system in corporate India has brought quantum change and associated incremental cash benefits in different areas such a focus on profitable customers, change in product pricing strategy, elimination of redundant activities through the entire value chain, product mix and outsourcing decisions. It led to change in the strategic focus.

In this present issue we have incorporated an article on Implementation of Activity Based Costing in Information Technology Company and other relevant articles on CSR, Capital Markets, etc. I feel academicians and professionals would be immensely benefitted by going through this volume of Research Bulletin.

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. I express my sincere thanks to all the contributors and reviewers of this important issue and expect our readers get plenty of academic inputs from the articles.

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AN EMPIRICAL ANALYSIS ON SEASONAL ANOMALIES IN BSE SECTORAL INDICES

P. Nageswari
L. Philo Daisy Rani

Abstract:

The presence of the Seasonal Effect in stock returns has been reported in several developed and emerging stock markets. This study investigates the existence of seasonality in India's stock market. The Efficient Market Hypothesis suggests that all securities are priced efficiently to fully reflect all the information intrinsic in the asset. The Seasonal Effects create higher or lower returns depending on the Time Series. They are called Anomalies because they cannot be explained by traditional asset pricing models. The main aim of this paper analyzed the seasonal anomalies in BSE Sectoral indices. For the purpose of this study it considered two indices namely S&P BSE Consumer Goods & Services and S&P BSE Finance Index based on the highest turnover. The study covered for a period of ten years from 1st January 2006 to 31st December 2016. According to the result of the study, it found that there was highest mean return on Wednesday in S&P BSE Consumer goods & Services index and Friday in S&P BSE Finance index. And also negative returns were recorded on Tuesday for both the sample indices. The Cross Correlation analysis found out that there was significant positive relationship between Tuesday & Wednesday and Thursday & Friday. And also negative significant relationship between Monday & Friday. The dummy variable regression analysis found that there was no significant Day of the Week Effect exists in Indian Sectoral Indices during the study period.

Key Words:

Bombay Stock Exchange, Efficient Market Hypothesis, Seasonal Anomalies, Sectoral Indices, Day of the Week Effect, Indian Stock Market



Introduction

An efficient market is one where a large number of rational and informed investors actively compete with one another and predict the future market values of individual securities. The market efficiency is, assumed in spite of the Tax Asymmetries, Information Asymmetries, Difference in Transaction Costs, Trading Restrictions, Week-End-Effects, Varying Trading Practices etc. The stock return behavior has been subjected to extensive research in the past and it has been observed that the return of Monday is significantly negative and Friday experienced high positive returns. This observation is generally referred to as 'Day-of-the-Week-Effect' or 'The-Week-End-Effect'. Seasonality refers to regular and repetitive fluctuation in a Time Series which occurs periodically over a span of less than a year. The main cause of seasonal variations in time series data is the change in climate. For example, sales of woolen clothes generally increase in winter season. Besides this, customs and tradition also affect economic variables for instance sales of gold increase during marriage seasons. Similarly, stock returns exhibits systematic patterns at certain times of the day, week or month. The most common of these are Monthly Patterns. Certain Months provide better returns as compared to otherwise. The Month of the Year Effect. Similarly, some Days of the Week provide lower returns as compared to other trading days. Days of the Week Effect. The existence of Seasonality in stock returns, however, violates an important hypothesis in finance called the Efficient Market Hypothesis (EMH). The Efficient Market Hypothesis is a central paradigm in finance. New Data constantly enter the market place via Economic

Reports, Company Announcements, Political Statements, and or Public Surveys.

It is observed that the absence of identical mean returns across all days of the week may be attributed to amongst many other factors, Asymmetrical Information Arrival on each day of the week. For instance, as the stock market closes during the week end, (Saturday and Sunday), the information accumulation and processing take place on Monday and, thereby, wide price swings may be noticed on Monday. The researchers also documented that the bad news is generally released after the market closure on Friday (Patel and Wolfson, 1982; penman, 1987; and Dyl and Maberly, 1988). If Investors have the ability to comprehend the price swings and earn extra-normal returns, they counter the principle of market efficiency. In addition, any systematic pattern of price changes across days of the week may also help some trading strategy to earn abnormal returns. Against this background, this paper attempts to focus on stock returns variability across day of the week and to find out the existence of Week-End Effect in S&P BSE Sectoral Index returns.

Review of Literature

Several studies have been conducted to analyze the Seasonal Anomaly of Indian as well as Global Capital Market. The reviews of previous studies made in India and abroad are given below.

Amanulla.S and Thiripalraju (2001), found that there was consistent positive returns on Wednesdays and negative returns on Tuesdays due to possible impact of the Week End Effect. **Chotigcat .T and Pandey I M. (2005)** investigated the Monthly Effect on stock returns for the stock market in India



and Malaysia. This study empirically confirmed the existence of Seasonality in stock returns in both capital markets. The study suggested that the Indian Stock Market would move in the direction of higher level of efficiency and the investors would earn returns commensurate with risk. **Hareesh Kumar.V and MalabikaDeo (2007)** analyzed the efficiency of Indian Stock Market by using S&P CNX 500 Index. They discovered the presence of Day of the Week Effect in the Indian Stock Market, which affected both the stock returns and volatility, thereby proving the Indian Stock Market to be inefficient. **Ushad Subadar Agathee (2008)** found the average returns of Stock Exchange of Mauritius (SEM) to be the lowest in the Month of March and Highest in the Month of June. The equality of means-return tests shows that returns were statistically the same across all months. The regression analysis reveals that returns were not independent of the Months of the Year, except for January. **Selvarani.M and LeenaJenefa (2009)** analyzed the trends in annual returns and daily returns. It was found that in the NSE, there was strong evidence of April and January Effect. After the introduction of the Rolling Settlement, Friday had become significant. As far as the Day Effect was concerned, Tuesday Effect was more prevalent than Monday Effect. **Nageswari .P and Selvam .M (2011)** examined the Day of the Week Effect during the Post Rolling Settlement Period. The study found that the Highest Mean Return on Friday and the Lowest Mean Return on Tuesday were observed during the study period. Further, there was strong significant positive relationship between Monday - Friday and no significant relationship among other days of the week. The results indicated that the Day of the Week Effect did not exist in the Indian Stock Market

during the study period. **Nageswari .P and Selvam .M (2011)** studied the seasonal analysis in the Indian Stock Market. The study found out that there was maximum return earned on Wednesday and negative returns recorded on Monday during the study period. The regression results confirmed the seasonal effect does not exist in stock returns in India. The study further revealed that January, February and March have recorded negative returns but are the best months to buy the scripts (buy low) and November and December show significant positive high returns goading us to conclude that these two month share the best period to sell the securities (sell high). Tax-loss selling hypothesis could be the possible explanations for the above phenomenon. The returns in the stock market are not independent across different trading days of the week. **Nageswari .P ,Selvam .M and Sankaran V.(2013)** studied the calendar anomalies in BSE Sensex returns. The study found that there was positive mean returns recorded for all days of the week and highest mean return was recorded on Friday and lowest mean return on Monday. The monthly returns analysis found that the highest mean returns were recorded in December and the negative mean returns recorded in January. The returns for the first of the month were higher than the returns for the second half month. Also, returns for the pre-holiday period were higher than the returns for post-holidays and weekdays. The study concluded that during the post rolling settlement period didn't observe anomalous stock market behavior in the BSE Sensex index in an environment of increased liquidity and stock market turnover subsequent to the post compulsory rolling settlement period. **Nageswari .P, Selvam .M, Vanitha S and Babu .M (2013)** revealed the January anomaly in the Indian



stock market. Their study found that the highest mean return was earned in December and the negative mean return earned in the month of January. It also found that there was significant difference in the mean returns among the months of the year. The analytical results of seasonality indicate the absence of January anomaly during the study period.

The above literature provides an overview of Valuation of Seasonality Effects in various Stock Markets. An attempt has been made in this study to analyze the Stock Market Seasonality in India by taking the model from the above study. Many of the previous studies in India and abroad were considered in major Indices only. Not much studies in sector wise analysis and also BSE. To fill this above gap the study carried out in BSE Sectoral indices.

Statement of the Problem

An efficient stock market can instantaneously process the information and it will be reflected on security prices. This information Transmission Mechanism ensures that the stock returns across all Days of the Weeks and Months are equal. Hence the market participant, the rational financial decision maker, cannot earn any extra-normal profits. It is to be noted that the returns constitute only one part of the decision making process. Another part of decision making is the calculation of risk or volatility of returns. It is important that there are variations in volatility of stock returns by the Day-of-the Week, Month of the Year,. Besides, a high (low) return is associated with a correspondingly high (low) volatility for a given day. If the investors can identify a certain pattern in volatility, then it would be easier to make investment

decision based on both returns and risk. It is against this background, an attempt has been made in this study to examine Seasonal Analysis in the BSE Sectoral Index returns afresh so as to remove the ambiguity in results, if any.

Objectives of the Study

The following are the objectives of the present study

- To identify the normality and stationary of the BSE Sectoral Index returns.
- To know the relationship between trading days of the week.
- To examine whether the Day of the Week Pattern exists in BSE Sectoral Index returns

Hypotheses of the Study

The present study tested the following Null Hypothesis

NH₁- There is no normality and non stationary among trading Days of the week.

NH₂- There is no significant relationship between trading days of the week.

NH₃- There is no significant day of the week effect in the BSE Sectoral Index returns among trading Days of the Week

Methodology of the study

Sample Selection

BSE is the oldest Stock Exchange in Asia; More than 5500 companies are listed on BSE making it world's No. 1 exchange in terms of listed companies. The companies listed on



BSE command a total market capitalization of USD 1.64 Trillion as on September 2015. It is also one of the world's leading exchanges (5th largest in September 2015) for Index options trading (Source: World Federation of Exchanges). It is the first exchange in India and the second in the world to obtain an ISO 9001:2000 certifications. BSE's popular equity index - the S&P BSE SENSEX - is India's most widely tracked stock market benchmark index. It is traded internationally on the EUREX as well as leading exchanges of the BRCS nations (Brazil, Russia, China and South Africa). S&P BSE have different classification of indices. In sector/ industry wise classification there are 19 sectoral indices. Out of 19 sectoral indices the study took only 2 indices namely S&P BSE Finance and S&P BSE Consumer Discretionary Goods & Services based on the highest turnover earned on 25th November 2016, 472.28 and 392.93(Rs.Cr) respectively.

Sources of data

The required data for the present study were collected from the BSE website and relevant research papers, journals, books, etc.

Period of the Study

The present study covers a period of ten years from 1st January 2006 to 31st December 2016.

Tools used for Analysis

In this study, independence of return series was investigated for BSE Sectoral Index and the returns were calculated as follows.

i) Returns

To compute the daily returns for each of the index series the following formula was used:

$$R_t = \ln \left[\frac{I_t}{I_{t-1}} \right] * 100$$

Where,

- R_t=Daily return on the Index (I),
- ln = Natural log of underlying market series (I),
- I_t = Closing value of a given index (I) on a specific trading day (t), and
- I_{t-1} = Closing value of the given index (I) on preceding trading day (t-1).

ii) Descriptive Statistics

In this part, Statistics of the Average Daily Return, Standard Deviation, Skewness, Kurtosis and Jerque-Bera were used for the purpose of analysis.

iii) Kruskal-Wallis Test

The Kruskal-Wallis Test is employed for testing the equality of mean returns among different trading days of the week. The formula for calculating the Test Statistic 'H' is as under:

$$H = \frac{12}{N(N+1)} X \sum_{j=1}^5 \frac{R2j}{n_j} - 3(n+1)$$

Where:

- R_j= Sum of the Ranks in the jth Column
- n_j= Number of Cases in the jth Column,
- N= Sum of Observations in all the Columns



iv) Cross Correlation

Cross Correlation is a standard method of estimating the degree to which two series are correlated. To know the relationship between ratios, the following equation is used:

$$r = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{n(\sum x^2 - (\sum x)^2)(n\sum y - (\sum y)^2)}}$$

Where,

N = Number of observations
Σx = Dependent variables, and
Σy = Independent variables

v) Unit Root Test

A Unit Root Test is designed to find out whether a time series variable is non-stationary. The most famous test is an Augmented Dickey-Fuller test

Augmented Dickey-Fuller Test

An **Augmented Dickey-Fuller Test (ADF)** is an augmented version of the Dickey-Fuller test for a larger and more complicated set of time series models. The Augmented Dickey-Fuller (ADF) statistic, used in the test, is a negative number. The more negative it is, stronger the rejection of the hypothesis that there is a unit root at some level of confidence.

The testing procedure for the ADF Test is the same as for the Dickey-Fuller Test that is applied to the model.

$$\Delta y_t = \alpha + \beta t + \gamma y_{t-1} + \delta_1 \Delta y_{t-1} + \dots + \delta_p \Delta y_{t-p} + \epsilon_t$$

Where α is a constant, β the coefficient on a time trend and p the lag order of the autoregressive process. Imposing the constraints $\alpha = 0$ and $\beta = 0$ corresponds to modeling a random walk and using the constraint $\beta = 0$ corresponds to modeling a random walk with a drift.

vi) Linear Regression Model

According to the Day of the Week Effect, some systemic patterns in the stock returns depending on the day could be noticed. To examine whether there exists any Day of the Week Effect, the following mode was employed:

$$R_{it} = \alpha_1 i D1t + \alpha_2 i D2t + \alpha_3 i D3t + \alpha_4 i D4t + \alpha_5 i D5t + V_{it}$$

In the model, R_{it} is the return of the index on day t , $D1t$ is a dummy variable for Monday taking the value of 1 for all Monday observations and zero otherwise. $D2t$ is a dummy variable for Tuesday taking the value of 1 for all Tuesday observation and zero otherwise and so on.

The α is the coefficient that is estimated for each day of the week from Monday to Friday. V_{it} is the disturbance term. This model has been used by Mehdiian and Perry (2001).

Limitations of the Study

The following are the limitations of the present study

- ♣ This study was based mainly on secondary data.
- ♣ This study used only two BSE Sectoral Index returns and limited statistical



tools which have certain inherent limitations.

Results and Analysis of S&P BSE Consumer Goods & Services Index

1. Analysis of Descriptive Statistics of S&P BSE Consumer Goods & Services Index

The Results of Descriptive Statistics for S&P BSE Consumer Goods & Services Index for the period from January 2006 to December 2016 are presented in **Table-1**. It clearly explained that there is Positive mean returns were recorded for all trading days of the week except on Tuesday. The highest mean return (0.089) was recorded on Wednesday, with a Standard Deviation of 1.476 and the negative mean return (-0.003) was recorded on Tuesday. This explained that the share price might have been low on Tuesday and high on Wednesday. Hence investors are advised to buy the shares on Tuesday and sell them on Wednesday.

In case of risk measurement (Standard Deviation) there was highest risk (1.728) faced by the Consumer Goods & Services industry on Monday and lowest risk (1.3483) on Thursday during the study period. This clearly indicates that the Stock Market was more volatile on Monday and least volatile on Thursday. The return distribution was negatively skewed on all trading days of the week. The value lies between -0.056 to -1.216.

The Kurtosis measure of returns distribution was Leptokurtic for all days of the week, Highest Value earned (13.57) on Friday. The coefficient value of Jarque-Bera was significant at 1% level for all trading days. This implies that the returns were asymmetric and did not conform to normal distribution during the study period.

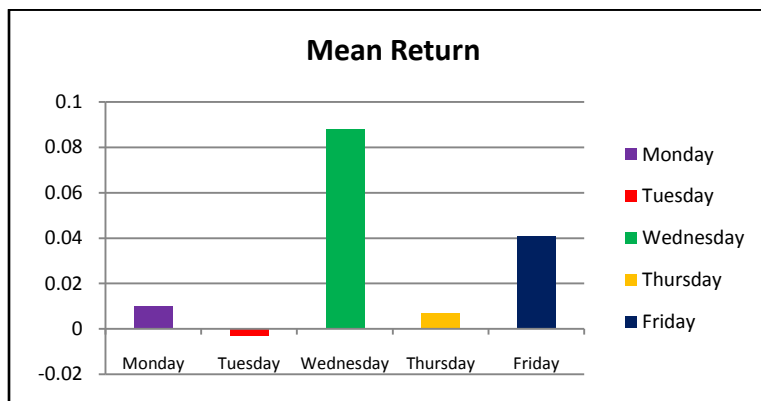
Table-1
The Results of Descriptive Statistics for S&P BSE Consumer Goods & Services Index Returns for the period from January 2006 to December 2016

Statistics	Monday	Tuesday	Wednesday	Thursday	Friday
Mean	0.011	-0.003	0.089	0.007	0.045
Median	0.173	0.071	0.171	0.117	0.082
Maximum	11.398	6.143	6.686	5.460	6.792
Minimum	-10.056	-8.952	-6.592	-6.455	-12.42
Std. Dev.	1.728	1.464	1.476	1.383	1.546
Skewness	-0.589	-0.580	-0.076	-0.590	-1.246
Kurtosis	11.282	8.608	7.660	7.242	14.578
Jarque-Bera	1323.71	475.75	298.17	263.02	2420.84
Probability	0	0	0	0	0
Observations	496	497	498	492	485

Source: Computed from E-views

Chart-1 clearly displays the average mean return for S&P BSE Consumer Goods & Services Index Returns from January 2006 to December 2016. It is clear from the above Chart that there were positive mean returns for all days of the week except on Tuesday and the highest mean return was earned on Wednesday.

Chart-1
Average Returns of Trading Days of the Week for S&P BSE Consumer Goods & Services Index Returns from January 2006 to December 2016



Source: Computed from Table-1

2. Analysis of Kruskal-Wallis Test for S&P BSE Consumer Goods & Services Index

The analysis of Kruskal-Wallis Test for S&P BSE Consumer Goods & Services Index for the period from January 2006 to December 2016 is given in **Table-2**. According to the results as given in the above Table, the Kruskal-Wallis Statistics Value was lower (2.57) than the Table Value (9.49) at 5% level of significance in 4 degrees of freedom. This implies that during the study period there was no significant difference between the returns of different trading days of the week. Hence the Null Hypothesis (NH_1), "There is no significant difference in the mean returns among the trading days of the week", cannot be rejected.

Table- 2
The Results of Kruskal-Wallis Test for S&P BSE Consumer Goods & Services Index Returns from January 2006 to December 2016

KW Test Statistics	
Chi-Square	2.57
Df	4
Asymp. Sig.	0.686



Degrees of freedom.	N-1	4	N=	Table value:1% - 13.277
5				5% - 9.488

Source: Computed from SPSS

3. Analysis of Cross Correlation Test for S&P BSE Consumer Goods & Services Index

Table-3 Shows the results of Cross Correlation Test for S&P BSE Consumer Goods & Services Index for the period from January 2006 to December 2016. From the analysis of the above table pointed out that there was significant positive relationship between Tuesday and Wednesday at 1% significant level and Monday and Thursday positively significant at 5% level. And also there was positive significant relationship between Thursday and Friday at 1% level. The remaining days were no significant relationships exist during the study period.

Table-3
The Results of Cross Correlation Test for S&P BSE Consumer Goods & Services Index Returns from January 2006 to December 2016

Week Days	Pearson Correlation	Monday	Tuesday	Wednesday	Thursday	Friday
Monday	Pearson Correlation	1				
	Sig. (2-tailed)					
	N	496				
Tuesday	Pearson Correlation	0.015	1			
	Sig. (2-tailed)	0.756				
	N	496	497			
Wednesday	Pearson Correlation	-0.022	.151**	1		
	Sig. (2-tailed)	0.624	0.002			
	N	496	497	498		
Thursday	Pearson Correlation	.121*	0.027	0.006	1	
	Sig. (2-tailed)	0.025	0.552	0.89		
	N	492	492	492	492	
Friday	Pearson Correlation	-0.053	-0.044	0.035	.140**	1
	Sig. (2-tailed)	0.246	0.329	0.443	0.004	
	N	485	485	485	485	485

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

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

Source: Computed from SPSS

4. Analysis of Unit Root Test for S&P BSE Consumer Goods & Services Index

The Results of Unit Root Test for BSE Consumer Goods & Services Index from January 2006 to December 2016 are given in **Table-4**. It is clearly observed from the analysis of above Table that the returns for all days of the week were stationary, which is the test statistics value was higher than the test critical value at Level Difference itself. Further, it was tested with

First Level Difference which proved that the returns were stationary with critical Values of (-3.443) and (-2.867) at 1% level, and 5% level respectively. From the overall analysis of the Table, it is found that the Wednesday recorded highest test statistics value (-24.33) than other trading days of the week. A more negative statistics value implies that the Null Hypothesis is strongly rejected and the alternative hypothesis. i.e. “The daily index returns were stationary in Indian Stock Market”, is accepted. Therefore it is suggested that the investors may invest in the market to earn the normal returns.

Table-4
The Results of Unit Root Test for S&P BSE Consumer Goods & Services Index Returns from January 2006 to December 2016

Weekdays	Significant level	ADF-test	
	Test statistic	Level difference	1 st Difference
Monday	Test statistic	-21.8436*	-12.600*
Test critical values	1% level	-3.443	-3.443
	5% level	-2.867	-2.867
Tuesday	Test statistic	-21.906*	-14.423*
Test critical values	1% level	-3.443	-3.443
	5% level	-2.868	-2.868
Wednesday	Test statistic	-24.330*	-14.679*
Test critical values	1% level	-3.443	-3.443
	5% level	-2.867	-2.867
Thursday	Test statistic	-22.201*	-14.166*
Test critical values	1% level	-3.443	-3.443
	5% level	-2.867	-2.867
Friday	Test statistic	-21.175*	-15.497*
Test critical values	1% level	-3.443	-3.443
	5% level	-2.867	-2.867

Source: Computed from E-Views

*Significant at 1% level.

Note: ADF Test-Augmented Dickey Fuller Test.

5. Analysis of Linear Regression Model for S&P BSE Consumer Goods & Services Index

The Results of the Linear Regression Analysis for S&P BSE Consumer Goods & Services Index Returns from January 2006 to December 2016 are revealed in Table-5. The above Table shows the estimated coefficients for each day of the week, t-value and its p-value. The Benchmark Day in the model was Monday, represented by the intercept which is C. It clearly explained that the co-efficient value of Monday (Constant Variable) was recorded highest (0.10) followed by Wednesday and negative co-efficient value on Tuesday and Thursday. But none of the coefficient value significant at 5% level. This indicated that there was no



significant effect on the trading day's week. The F-value measures the overall fit of the model. The F-value and its insignificant p-value explained that the overall fit of the model was poor. Further the adjusted R-squared value was negative. The Durbin-Watson Statistic Value of 1.64 indicates Autocorrelation in the residuals.

Table-5
The Results of Linear Regression Model for S&P BSE Consumer Goods & Services Index Daily Returns from January 2006 to December 2016

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Tuesday	-0.015	0.097	-0.138	0.897
Wednesday	0.082	0.098	0.826	0.417
Thursday	-0.006	0.098	-0.038	0.985
Friday	0.034	0.097	0.329	0.744
C	0.012	0.065	0.147	0.882
Adjusted R-squared		-0.001	F-statistic	0.308
Durbin-Watson stat		1.642	Prob(F-statistic)	0.877

Source: Computed from E-views

Results and Analysis of S&P BSE Finance Sector Index

1. Analysis of Descriptive Statistics of S&P BSE Finance Index

The Results of Descriptive Statistics for S&P BSE Finance Index for the period from January 2006 to December 2016 are presented in Table-6. It noticeably explained that there is Positive mean returns were recorded for all trading days of the week except on Tuesday. The highest mean return (0.101) was recorded on Friday, with a Standard Deviation of 2.01 and the negative mean return (-0.04) was recorded on Tuesday. This explained that the share price might have been low on Tuesday and high on Friday.

The Standard Deviation measured the risk of the return distribution. It pointed out that there was highest risk (2.23) challenged by the Finance industry on Monday and lowest risk (1.77) on Thursday during the study period. This clearly indicates that the Stock Market was more volatile on Monday and least volatile on Thursday. The return distribution was positively skewed on Monday and Wednesday and negatively skewed on remaining trading days of the week. The Kurtosis measure of returns distribution was Leptokurtic for all days of the week, Highest Value earned (12.61) on Monday. The coefficient value of Jarque-Bera was significant at 1% level for all trading days. This implies that the returns were asymmetric and did not conform to normal distribution during the study period. So the null hypotheses NH_1 - "There is no normality among the trading Days of the week" is cannot rejected.



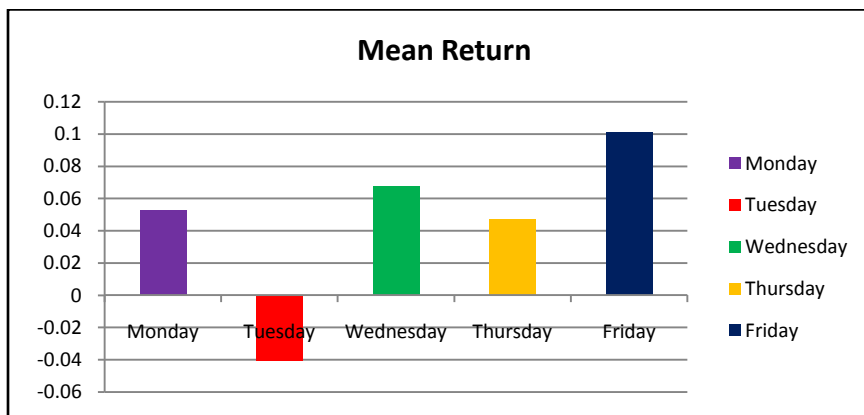
Table-6
The Results of Descriptive Statistics for S&P BSE FinanceIndex Returns for the period from January 2006 to December 2016

Statistics	Monday	Tuesday	Wednesday	Thursday	Friday
Mean	0.053	-0.040	0.067	0.047	0.101
Median	0.176	0.009	0.043	0.114	0.098
Maximum	17.346	8.118	9.272	7.233	8.100
Minimum	-9.978	-7.369	-7.814	-6.774	-12.474
Std. Dev.	2.236	1.834	1.782	1.775	2.009
Skewness	0.394	-0.091	0.228	-0.106	-0.409
Kurtosis	12.610	5.475	5.736	5.204	7.316
Jarque-Bera	1925.26	128.05	160.28	100.48	393.08
Probability	0	0	0	0	0
Observations	497	499	500	492	489

Source: Computed from E-views

The average mean return for S&P BSE Finance Index Returns from January 2006 to December 2016 was demonstrated in **Chart-2** clearly displays. It is clear from the above Chart that there were negative mean returns recorded on Tuesday and the highest mean return was earned on Friday during the study period.

Chart-2
Average Returns of Trading Days of the Week for S&P BSE Finance Index from January 2006 to December 2016



Source: Computed from Table-6



2. Analysis of Kruskal-Wallis Test for S&P BSE Finance Index

The analysis of Kruskal-Wallis Test for S&P BSE Finance Index for the period from January 2006 to December 2016 is presented in Table-7. It specified that, the Kruskal-Wallis Statistics Value was lower (3.09) than the Table Value (9.49) at 5% level of significance in 4 degrees of freedom. This implies that during the study period there was no significant difference between the returns of different trading days of the week.

Table- 7
The Results of Kruskal-Wallis Test for S&P BSE Finance Index Returns
from January 2006 to December 2016

KW Test Statistics	
Chi-Square	3.097
Df	4
Asymp. Sig.	0.542
Degrees of freedom. N-1 4 N= 5	Table value:1% - 13.277 5% - 9.488

Source: Computed from SPSS

3. Analysis of Cross Correlation Test for S&P BSE Finance Index

Table-8 Shows the results of Cross Correlation Test for S&P BSE Finance Index for the period from January 2006 to December 2016. The above table explained that there was significant positive relationship between Tuesday and Wednesday at 5% significant level and Monday and Friday negatively significant at 5% level. And also there was significant positive relationship between Thursday and Friday at 1% level. The remaining trading days were not significantly related during the study period. So the null hypotheses H_0 "There is no significant relationship between trading days of the week" is partially rejected.

Table-8
The Results of Cross Correlation Test for S&P BSE Finance Index Returns from January
2006 to December 2016

Week Days	Pearson Correlation	Monday	Tuesday	Wednesday	Thursday	Friday
Monday	Pearson Correlation	1				
	Sig. (2-tailed)					
	N	497				
Tuesday	Pearson Correlation	0.023	1			
	Sig. (2-tailed)	0.607				
	N	497	499			



Wednesday	Pearson Correlation	0.045	.114*	1		
	Sig. (2-tailed)	0.32	0.011			
	N	497	499	500		
Thursday	Pearson Correlation	0.02	-0.049	-0.027	1	
	Sig. (2-tailed)	0.657	0.275	0.553		
	N	492	492	492	492	
Friday	Pearson Correlation	-.095*	-0.087	0.077	.147**	1
	Sig. (2-tailed)	0.036	0.055	0.09	0.001	
	N	489	489	489	489	489

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

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

Source: Computed from SPSS

4. Analysis of Unit Root Test for S&P BSE Finance Index

The Results of Unit Root Test for BSE Finance Index from January 2006 to December 2016 are shown in **Table-9**. It is clearly analyzed from the above Table that the returns for all days of the week were stationary, which is the test statistics value was higher than the test critical value at Level Difference itself. Further, it was tested with First Level Difference which proved that the returns were stationary with critical Values of (-3.443) and (-2.867) at 1% level, and 5% level respectively. From the overall analysis of the Table, it is found that the returns were stationery at level difference at 1% significant level.

The result of stationary test was significant for all indices under ADF Test. Hence the Null Hypothesis (NH_1), "There is no stationary among trading Days of the week", is rejected.

Table-9
The Results of Unit Root Test for S&P BSE Finance Index Returns from January 2006 to December 2016

Weekdays	Significant level	ADF-test	
	Test statistic	Level difference	1 st Difference
Monday	Test statistic	-23.953*	-13.12*
Test critical values	1% level	-3.443	-3.443
	5% level	-2.867	-2.867
Tuesday	Test statistic	-22.837*	-13.923*
Test critical values	1% level	-3.443	-3.443
	5% level	-2.868	-2.868
Wednesday	Test statistic	-23.717*	-14.967*
Test critical values	1% level	-3.443	-3.443
	5% level	-2.867	-2.867
Thursday	Test statistic	-21.756*	-14.128*



Test critical values	1% level	-3.443	-3.443
	5% level	-2.867	-2.867
Friday	Test statistic	-23.2775*	-13.563*
Test critical values	1% level	-3.443	-3.443
	5% level	-2.867	-2.867

Source: Computed from E-Views

*Significant at 1% level.

Note: ADF Test-Augmented Dickey Fuller Test.

5. Analysis of Linear Regression Model for S&P BSE Finance Index

The Results of the Linear Regression Analysis for S&P BSE Finance Index Returns from January 2006 to December 2016 are given in Table-10. The above Table clearly explained that there was negative co-efficient value earned on Tuesday and Thursday and positive co-efficient value on remaining trading days of the week. But none of the coefficient value was significant at 5% level. This indicated that there was no significant day of the week effect in Bombay stock Market during the study period. The adjusted R- squared value was negative. F-value and its insignificant p-value explained that the overall fit of the model was poor. The Durban-Watson Statistic Value of 1.72 indicated that the Autocorrelation in the residuals. Hence the null hypotheses H_3 "There is no significant day of the week effect in the BSE Sectoral Index returns among trading Days of the Week" cannot be rejected.

Table-10
The Results of Linear Regression Model for S&P BSE Finance Index Returns from January 2006 to December 2016

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Tuesday	-0.094	0.123	-0.760	0.447
Wednesday	0.015	0.123	0.118	0.906
Thursday	-0.006	0.124	-0.049	0.961
Friday	0.049	0.124	0.395	0.693
C	0.053	0.087	0.607	0.544
Adjusted R-squared		-0.001	F-statistic	0.365
Durbin-Watson stat		1.726	Prob.(F-statistic)	0.834

Source: Computed from E-Views



Findings and Suggestions of the Present Study

The followings are the some of the important findings of this present study.

- ❖ There is Positive mean returns were recorded for all trading days of the week except on Tuesday.
- ❖ The highest mean return was recorded on Wednesday, and the negative mean return was recorded on Tuesday in BSE Consumer goods and Services Index returns.
- ❖ So, it is advised that the investors may buy the shares on low (Tuesday) and sell these shares on high (Wednesday) in the Bombay Stock Market Sectoral Indices; it will give the better returns to the investors.
- ❖ There was highest risk faced by the Consumer Goods & Services industry on Monday and lowest risk on Thursday during the study period.
- ❖ This clearly indicates that the Stock Market was more volatile on Monday and least volatile on Thursday. So it suggested that the investors may watch the market regularly to avoid such type of risk involved in the market
- ❖ The return distribution was negatively skewed on all trading days of the week.
- ❖ The Kurtosis measure of returns distribution was Leptokurtic for all days of the week, Highest Value earned on Friday.
- ❖ The coefficient value of Jarque-Bera was significant at 1% level for all trading days. This implies that the returns were asymmetric and did not conform to normal distribution during the study period for both sample index returns.
- ❖ The Kruskal-Wallis Statistics found that during the study period there was no

significant difference between the returns of different trading days of the week.

- ❖ The analysis of the study finds that there was significant positive relationship between Tuesday and Wednesday at 1% significant level and Monday and Thursday significant at 5% level.
- ❖ And also there was positive significant relationship between Thursday and Friday at 1% level.
- ❖ S&P BSE Finance index returns highest mean return was recorded on Friday, and the negative mean return was recorded on Tuesday.
- ❖ This explained that the share price might have been low on Tuesday and high on Friday.
- ❖ S&P BSE Finance index returns distribution was positively skewed on Monday and Wednesday and negatively skewed on remaining trading days of the week.
- ❖ Both Sample index returns for all trading days of the week were stationary, which is the test statistics value was higher than the test critical value at Level Difference itself.
- ❖ The study finds out that both the sample index returns indicated that there was no significant day of the week effect in Bombay stock Market during the study period.

Conclusion

The main objectives of this paper analyzed the seasonal anomalies in BSE Sectorial index returns. For the purpose of this study it considered two indices namely S&P BSE Consumer Goods & Services and S&P BSE Finance Index based on the highest turnover. The study covered for a period of ten years



from 1st January 2006 to 31st December 2016. The result of the study find out that there was highest mean return on Wednesday in S&P BSE Consumer goods & Services index and Friday in S&P BSE Finance index. And also negative returns were recorded on Tuesday for both the sample indices. Hence it is suggested to the investors buy the shares at lowest price (on Tuesday) and sell them on highest returns (on Friday). The Cross Correlation analysis found out that there was significant positive relationship between Tuesday & Wednesday and Thursday & Friday. And also negative significant relationship between Monday & Friday. The dummy variable regression analysis found that there was no significant Day of the Week Effect exists in Indian Stock Market during the study period. The findings challenge the concept of Efficient Market Hypotheses in its weak form. The returns in the stock market are same across different trading days of the week. The Study also provides evidence that the market was not able to price the risk appropriately as higher returns were possible by taking less risk and this indicates market inefficiency. The Study found out that the day of the week effect pattern did not appear to exist in Indian Stock Market. The findings of this study would possibly help in understanding and explaining such seasonality for the Indian stock markets. These findings have important implications for financial managers, financial analysts and investors. The understanding of seasonality may help them to develop appropriate investment strategies.

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BOARD COMMITTEES *VIS A VIS* FINANCIAL PERFORMANCE: AN INSIGHT INTO SELECT INDIAN COMPANIES

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Abstract:

The present study examines the relationship of characteristics of board of directors and other board committees (i.e., audit committee, shareholder's grievance committee and remuneration committee) with firm performance using panel regression models. The sample consists of 155 CNX200 firms listed in NSE during the period 2006 to 2013. This study finds a positive association between number of board meetings and attendance in these meetings with firm's financial performance. The size of the audit committee and number of meetings of the audit committee do not show any association with any of the measures of financial performance. In the case of other board subcommittees, the results suggest that higher frequency of shareholder grievance committee meetings leads to better financial performance in companies while it is not so for remuneration committee.

Key Words:

Board Committees, Financial Performance, Panel Regression



Introduction

Corporate governance has evolved as an important issue for efficient management of an organization over the last few decades and there have been many studies which link the financial performance of a firm with proper adoption of corporate governance practices. The board of directors and the board subcommittees are important parts of corporate governance of a firm. "The board of directors of a corporation is meant to perform the critical functions of monitoring and advising top management. Conventional wisdom suggests that a greater level of board independence allows for more effective monitoring and improves firm performance" (Coles *et al.*, 2008). The board of directors has been considered as one of the most important corporate governance mechanisms in decision making and monitoring of firms (Zahra & Pearce, 1989; Wan & Ong, 2005; Garg, 2005). Tricker (1994) suggests that three well accepted oversight committees are established to carry out the board work rigorously; these are audit committee, shareholder's grievance committee and remuneration committee. In this respect, an important empirical question is whether the adoption of any specific governance mechanism is beneficial to firm performance. It has been suggested by previous studies that establishment of board subcommittees help to improve the efficiency of board in discharging their duties (Jiraporn *et al.*, 2009). The subcommittees that have been considered in this study are audit committee, shareholders grievance committee and remuneration & nomination committee whose formation has resulted in an improvement in the quality of financial reporting and a positive impact on firm

performance (Yermack, 1996; Vafeas, 1999; Gendron and Bedard, 2006; Jackling & Johl, 2009; Johlet *et al.*, 2015). There have been research on various aspects of corporate governance in emerging economies like India also (Balasubramanyam, Black & Khanna, 2010; Sarkar & Sarkar, 2012; Muttakin, *et al.*, 2012; Bansal & Sharma, 2016). This study examines the relationship of characteristics of board of directors and other board committees (i.e., audit committee, shareholder's grievance committee and remuneration committee) with firm performance in Indian context taking into account various requirements of Clause 49 of the Listing agreement. The governance mechanisms for different dimensions have been chosen in accordance with Clause 49 of the listing agreement issued by Security Exchange Board of India (SEBI) for compliance on corporate governance guidelines.

Literature Review

There exist a number of theoretical and empirical studies in the field of corporate governance and firm performance in both the developed countries and emerging economies like India. In this section the studies relating to various facets of board of directors and board sub-committees (audit committee, shareholders grievance committee and remuneration committee) with firm's financial performance have been discussed.

Regarding board size, some previous studies suggest that board size does not impact firm's financial performance while according to agency theory a smaller board size is more effective than larger board size (Lipton and Lorsch, 1992; Jensen, 1993). Lipton and Lorsch (1992) suggest that the



board size between eight and nine directors is appropriate because the additional cost associated with slow decision-making is higher than the benefits obtained from large number of directors if the number of directors exceeds ten. Yermack (1996) has investigated board size-performance relationship and an inverse relationship between board size and firm performance has been observed. Some studies state that large boards are better for firm's performance (Pearce & Zahra, 1992; Jackling & Johl, 2009; Johl *et al.*, 2015). On the other hand, Hermalin and Weishbach (2003) and Garg (2007) note negative relation between board size and firm performance. Pearce and Zahra, (1992) observe that bigger board size increases the pool of experts and this expertise can be utilized for making strategic decisions leading to enhancement of firm's performance. According to Coles *et al.* (2008) large board size is positively associated with firm performance in complex firms than simple firms. These complex firms have larger boards with more outside directors because larger boards potentially bring more experience and knowledge and offer better advice (Dalton, Daily, Johnson, & Ellstrand, 1998). Johl *et al.* (2015) examine 700 public listed firms in Malaysia and observe that larger board size has positive influence on firm performance.

Another important feature of board of directors is presence of outside or independent directors. There is ample evidence in prior literature which shows that presence of outsiders in the board can increase firm performance. Rosenstein and Wyatt (1990) have noted that addition of outside directors in the board results in positive abnormal returns. Bhagat and Black (2002) provide an evidence that low-profitability firms increase the

independence of their boards of directors. Daily and Dalton (1993) find a positive relationship between proportion of outside directors and firm performance. Kiel *et al.* (2003) also find a positive relationship between the proportion of inside directors and the market-based measure of firm performance with respect to 348 of Australia's largest publicly listed companies. The authors however note a positive association of board independence with firm performance in non-family firms. In recent studies by Mateus *et al.* (2015) and Abdulsamad *et al.* (2018), a positive association of board independence with firm performance has been noted. Also there have been some studies which show no relationship between board composition and firm performance (Klein, 1998; Adams & Mehran, 2012; Wintocki, 2012).

The studies on board activity and firm performance provide mixed results. Lipton and Lorsch (1992) suggest that the greater frequency of meetings is likely to result in superior financial performance. Jensen (1993) suggests that boards should be relatively inactive and evidence of higher board activity is likely to symbolize a response to poor performance. Vafeas (1999) observes that boards that met more frequently are valued less by the market. However, this association disappears when prior stock performance is included in the model, suggesting that operating performance rises following years of abnormally high meeting frequency. Johl *et al.* (2015) observe that less frequent board meetings and higher percentage of board members with accounting expertise have a positive relationship with firm performance. Abdulsamad *et al.* (2018) examine a sample of 341 Malaysian public listed firms from a period ranging 2003 to 2013. The results



show a weak and negative association of board meetings with firm performance.

The studies on audit committee characteristics and firm performance also provide mixed results. Klein (2002) and Xie *et al.*, (2003) find that level of earnings management is inversely related to audit committee independence. These studies also find that audit committees which are more active are capable of reducing earnings management as compared to only independent audit committees. A negative association between frequency of meetings of audit committee and firm performance has been reported in previous studies (Xie *et al.*, 2003). Similarly, Weir *et al.* (2002) observe a little relationship between board structure and audit committee structure with firm performance. Woidtke *et al.* (2013) suggested that an emphasis on audit committee independence alone may not be sufficient to enhance earnings informativeness. Barka and Legendre (2016) observe that an audit committee that is fully independent or meets frequently is associated with lower firm performance. There have been studies on audit committee characteristics and firm performance in Indian context too [Sarkar & Sarkar (2010); Mishra and Mohanty (2013); Bansal & Sharma (2016)]. Sarkar and Sarkar (2010) conduct a study with respect to auditors and audit committee independence in India and suggest that relevant and high quality disclosures are one of the most powerful tools that are available to the independent directors to facilitate them in monitoring the performance of a company.

There are many studies which relate the executive compensation with firms' performance but studies related to remuneration committee characteristics and

firm performance are limited [Main *et al.* (2008); Black and Kim (2012)]. Shareholder's rights have been a topic of discussion in many studies across the world but it is still at a nascent stage in India. In fact, one of the major problems in Indian corporate governance system is the conflict between minority shareholders and dominant shareholders (Sarkar & Sarkar, 2000). The creation of a remuneration committee can help in aligning the interest of managers and shareholders by creating proper compensation and incentives [Klein (1998); Weir and Laing (2002)]. However, Main and Johnston (1993) suggest that presence of remuneration committee is associated with higher levels of executive pay which results in reduction of profitability. Black and Kim (2012) reported a positive and significant impact of audit and nomination committees for larger firms. On similar lines, Lam and Lee (2012) have got a negative impact of remuneration committee while a positive impact of nomination committee has been observed on financial performance of firms. According to a study by Mintah (2016) involving 63 firms for a time period of 12 years, the establishment of remuneration committee by the board is positively related to its financial performance, as measured by its Return on Assets (ROA).

Objectives

The main objective of this study is to examine the impact of different board committees and sub-committees on the financial performance of the select Indian firms. This main objective has been sub-divided into the following specific objectives:

1. To find the relationship between board of directors characteristics and



financial performance of the select firms

2. To check the relationship between audit committee characteristics and firm's financial performance.
3. To examine the impact of shareholders' grievance committee characteristics on financial performance of select firms.
4. To assess the association between remuneration committee characteristics and financial performance of select firms.

Hypotheses

The testable hypotheses of the present study are as follows:

1. There exists a positive relationship between board of director's characteristics and firms financial performance.
2. Audit committee characteristics and firm's financial performance are positively associated.
3. A positive relationship exists between shareholder's Grievance Committee (SGC) characteristics and firm's financial performance.
4. Remuneration committee characteristics positively affect firm's financial performance.

Database

The sample constitutes the CNX200 firms listed in NSE. From this sample, firms

belonging to banking sector have been excluded as they are governed by different set of regulations which are different from Company's Act. The public sector companies have also been excluded as they are bound by many social obligations which are difficult to justify. This approach has been followed in many previous Indian studies (Dwivedi & Jain, 2005; Sarkar & Sarkar, 2012). This brings the sample size to 155 firms. The corporate governance practices were followed by most of the companies by the year 2006 and hence the year 2006 has been chosen as the first year for the study. The Company's Act 1956 has been revised in the year 2013 and the changes were required to be followed by October 2014 by the listed companies. This study does not take into account these changes and therefore, period of the study is limited till the year 2013. So the time period chosen for the study is from 2006 to 2013. The data on the relationship between the specific governance mechanisms and firm's financial performance (measured by Tobin's Q and accounting based indicators represented by ROA and ROCE) have been collected from the Prowess database of CMIE. Besides, the corporate governance (CG) reports have been utilized to collect the details of board of directors, audit committee, shareholders grievance committee and remuneration committee. The details of these variables which are tabulated in Table 1 are explained below:

Table 1: Description of Variables of Specific Corporate Governance Mechanisms

Variable	Description
Board of Directors	
bod_size	Number of directors in the board
per_ind	Percentage of independent directors(ID) calculated by number of ID



	divided by board size
per_ned	Percentage of Non- Executive directors(NED) calculated by number of NED divided by board size
meet_bod	Number of meetings of board of directors in a year
per_att	Percentage of independent directors attending the board meeting calculated by total number of meetings attended by independent directors divided by total number of meetings held
per_agm	Percentage of independent directors attending the AGM calculated by dividing number of independent directors present in AGM with total number of directors
Audit Committee	
size_audit	Size of the audit committee means number of members in audit committee
per_ind_aud	Percentage of independent directors(ID) in audit committee calculated by number of ID divided by size of audit committee
meet_aud	Meetings of audit committee in an year
per_aud_att	Attendance of the members of audit committee in the audit committee meetings calculated by number of meetings attended divided by number of meetings held
Shareholder's' Grievance Committee	
size_sgc	Size of Shareholders Grievance Committee (SGC) which means number of members in Shareholders' Grievance Committee
per_ind_sgc	Percentage of independent directors(ID) in Shareholders' Grievance Committee calculated by number of ID divided by size of Shareholders' Grievance Committee
meet_sgc	Meetings of Shareholders Grievance Committee in a year
Remuneration Committee	
size_rc	Size of remuneration committee which means number of members in remuneration committee
per_ind_rc	Percentage of independent directors in remuneration committee calculated by number of ID divided by size of remuneration committee
meet_rc	Meetings of remuneration committee

The dependent variables for measuring firm performance include two accounting based measures [namely, Return on assets (ROA) and Return on Capital Employed (ROCE)] and one market based measure (i.e., Tobin's Q) which are exhibited in Table 2.

Table 2: Description of Performance Variables and Control Variables

Variable	Description
Tobin's Q	(Market value of equity+ book value of debt)/Total assets
ROA (Return on Assets)	Profit after tax+ Interest-Tax savings on interest/Total assets
ROCE (Return on Capital)	Earnings before interest and tax(EBIT)/Total capital employed



Employed)	
Age	Number of years since incorporation
Size	Natural logarithm of total assets
Leverage	Debt equity ratio

Data Analysis and Interpretation

This study uses a panel regression models. The parameters of these models can either be estimated by fixed effect model or by random effect model or by pooled OLS method. To test the suitability of the above mentioned methods, parameters of the models have been estimated first by pooled OLS method. Then the same parameters have been estimated by using fixed effect model using F- test in case of fixed effect model. To choose between the pooled OLS and fixed effect model Breush Pagan Langrange Multiplier (BPLM) test has been applied. A Hausman specification test is conducted to compare between a fixed effect model and a random effect model. The results of these tests have been discussed in details in Table 7 which illustrates the model specifications when board of director’s characteristics and various board sub-committee’s characteristics are taken as independent variables along with the control variables (age, size, leverage).

In order to analyse the impact of the different dimensions of board of directors on firm performance for all the select companies, the following fixed effect panel regression models have been considered in the present study:

$$(ROA)_{it} = \alpha_i + B_1 (bod_size)_{it} + B_2 (per_ind)_{it} + B_3 (per_ned)_{it} + B_4 (meet_bod)_{it} + B_5 (per_att)_{it} + B_6 (per_agm)_{it} + B_7 (age)_{it} + B_8 (size)_{it} + B_9 (lev)_{it} + \mu_{it} \text{-----}(1)$$

$$(TOBIN'S Q)_{it} = \alpha_i + B_1 (bod_size)_{it} + B_2 (per_ind)_{it} + B_3 (per_ned)_{it} + B_4 (meet_bod)_{it} + B_5 (per_att)_{it} + B_6 (per_agm)_{it} + B_7 (age)_{it} + B_8 (size)_{it} + B_9 (lev)_{it} + \mu_{it} \text{-----}(2)$$

$$(ROCE)_{it} = \alpha_i + B_1 (bod_size)_{it} + B_2 (per_ind)_{it} + B_3 (per_ned)_{it} + B_4 (meet_bod)_{it} + B_5 (per_att)_{it} + B_6 (per_agm)_{it} + B_7 (age)_{it} + B_8 (size)_{it} + B_9 (lev)_{it} + \mu_{it} \text{-----}(3)$$

[Meanings of the different notations have been stated in database section]

From Table 3, it has been observed that board size, percentage of independent directors and percentage of non- executive directors do not have a significant impact on firm performance when the measure of performance is Tobin’s Q, ROA or ROCE. However, number of board meetings held in a year and percentage of attendance of independent directors in the board meetings is associated positively with Tobin’s Q (5% level of significance). The percentage of attendance of independent directors in Annual General Meeting (AGM) has been found to be positively associated with ROA (5% level of significance). None of the other board characteristics have been found to have an association with ROCE.

The following models have been employed in order to analyse the impact of audit committee on firm performance:

$$(Tobin's Q)_{it} = \alpha_i + B_1 (size_aud)_{it} + B_2 (meet_aud)_{it} + B_3 (per_ind_aud)_{it} + B_4$$



$$(per_aud_att)_{it} + B_5 (age)_{it} + B_6 (size)_{it} + B_7 (lev)_{it} + \mu_{it} \text{-----(4)}$$

$$(ROA)_{i,t} = \alpha_i + B_1 (size_audit)_{it} + B_2 (meet_aud)_{it} + B_3 (per_ind_aud)_{it} + B_4 (per_aud_att)_{it} + B_5 (age)_{it} + B_6 (size)_{it} + B_7 (lev)_{it} + \mu_{it} \text{-----(5)}$$

$$(ROCE)_{i,t} = \alpha_i + B_1 (size_audit)_{it} + B_2 (meet_aud)_{it} + B_3 (per_ind_aud)_{it} + B_4 (per_aud_att)_{it} + B_5 (age)_{it} + B_6 (size)_{it} + B_7 (lev)_{it} + \mu_{it} \text{-----(6)}$$

[Meanings of the different notations have been stated in database]

Table 4, depicts the results of panel data regression of audit committee components and it has been noted that audit committee meetings and percentage of independent directors in audit committee have a positive impact Tobin’s Q at 5 % and 1% level of significance respectively. Regarding the control variables *i.e.*, age, size and leverage, the size of the firm have been found to be negatively significant with Tobin’s Q (1% level of significance) and ROA (5% level of significance). Leverage has been found to have a negatively significant association with Tobin’s Q (1% level). The constant terms are positive for Tobin’s Q (1 % level of significance) but negative for ROA (5% level of significance). Age has been found to be positively associated with ROA (5% level of significance) and ROCE (5% level of significance).

The equations employed for carrying out the impact of shareholders grievance committee and firm’s financial performance are stated below:

$$(Tobin'Q)_{i,t} = \alpha_i + B_1 (size_sgc)_{it} + B_2 (per_ind_sgc)_{it} + B_3 (meet_sgc)_{it} + B_4 (size)_{it} + B_5 (age)_{it} + B_6 (lev)_{it} + \mu_{it} \text{-----(7)}$$

$$(ROA)_{i,t} = \alpha_0 + B_1 (size_sgc)_{it} + B_2 (per_ind_sgc)_{it} + B_3 (meet_sgc)_{it} + B_4 (size)_{it} + B_5 (age)_{it} + B_6 (lev)_{it} + \mu_{it} \text{----- (8)}$$

$$(ROCE)_{i,t} = \alpha_0 + B_1 (size_sgc)_{it} + B_2 (per_ind_sgc)_{it} + B_3 (meet_sgc)_{it} + B_4 (size)_{it} + B_5 (age)_{it} + B_6 (lev)_{it} + \mu_{it} \text{----- (9)}$$

[Meanings of the different notations have been stated in database]

The results as can be seen in Table 5, indicate that meetings held by shareholders’ grievance committee is found to be positively related to Tobin’s Q (5% level of significance) and ROCE (1% level of significance). This means that higher frequency of shareholder grievance committee meetings result in better financial performance of companies. Looking at Table 6, it has been observed that the other characteristics of shareholder grievance committee that is size of the committee and independence of the committee do not have any association with firm’s financial performance in all the three equations. Among the control variables, age is found to be negatively related to ROA and ROCE at 5% level of significance while leverage is found to have a significant but negative impact on Tobin’s Q at 1% level of significance. The size of firm has not been found to have an association with financial performance of the firm in any of the equations.

The equations employed for carrying out the analysis of remuneration committee characteristics and firm performances are:



$$(Tobin's\ Q)_{it} = \alpha_1 + \beta_1(size_rc)_{it} + \beta_2(per_ind_rc)_{it} + \beta_3(meet_rc)_{it} + \beta_4(size)_{it} + \beta_5(age)_{it} + \beta_6(lev)_{it} + \mu_{it} \text{-----(10)}$$

$$(ROA)_{it} = \alpha_0 + \beta_1(size_rc)_{it} + \beta_2(per_ind_rc)_{it} + \beta_3(meet_rc)_{it} + \beta_4(size)_{it} + \beta_5(age)_{it} + \beta_6(lev)_{it} + \mu_{it} \text{-----(11)}$$

$$(ROCE)_{it} = \alpha_0 + \beta_1(size_rc)_{it} + \beta_2(per_ind_rc)_{it} + \beta_3(meet_rc)_{it} + \beta_4(size)_{it} + \beta_5(age)_{it} + \beta_6(lev)_{it} + \mu_{it} \text{----- (12)}$$

[Meanings of the different notations have been stated in database]

The results in Table 6 indicate that among the components of remuneration committee only the percentage of independent directors in remuneration committee positively affects the ROCE (10% level of significance). Considering the control variables *i.e.*, age, size and leverage, it has been observed that leverage has a negative and significant impact on Tobin's Q (1% level of significance) and ROA (10% level of significance). Size of the firm has a significant negative association with Tobin's Q at 1% level. The results indicate a positive association of independence of remuneration committee and corporate financial performance after controlling age, size and leverage of the firms. Looking at the values of adjusted R² for all the above mentioned equations, it can be noted that the value ranges between 0.0231 to 0.1015 which is low but significant. The low values of adjusted R² can also be seen in earlier studies in this field (Larcker *et al.*, 2007; Amman *et al.*, 2012, Mintah, 2014).

Summary and conclusion

This study observes a positive association between of number of board meetings and

attendance in these meetings with firm's financial performance. The size of the audit committee do not show any association with any of the measures of financial performance. However it is noted that audit committee meetings and percentage of independent directors in audit committee have a positive impact Tobin's Q. In the case of other board subcommittees, namely, shareholders grievance committee and remuneration committee, the results suggest that higher frequency of shareholder grievance committee meetings result in better financial performance in companies while it is not so for remuneration committee. A positive association between shareholder grievance committee characteristics and firm's financial performance is observed. However, in the case of remuneration committee characteristics, only independence of remuneration committee is found to be positively related to firm's financial performance. Hence, it is reasonable to state that among board subcommittees characteristics, the independence of remuneration committee and audit committee, attendance of audit committee meetings and frequency of meetings of shareholders grievance committee have a positive influence on financial performance of the firms. The results of this study suggest that in an emerging economy like India, board operations represented by board meetings held and attended respectively have more influence on financial performance than board size and independence. The results have also been supported by some previous studies which observed that if a firm is performing poorly then the companies increase the board activity by increasing the frequency of meetings. Thus, overall a relationship between some of the mechanisms of these committees and financial performance of the firms has been found in the present study.



Table 3: Relationship between Board of Directors Characteristics and Firms' Financial Performance

Regression parameters	Estimated values of regression parameters		
	Equation 1	Equation 2	Equation 3
β_1	-0.050 (-1.08)	-0.045 (-0.72)	-0.0957 (-1.18)
β_2	0.124 (0.19)	1.10 (0.87)	0.0957 (1.18)
β_3	0.037 (0.09)	0.612 (0.82)	0.171 (0.18)
β_4	-0.0167 (-0.40)	-0.115 (-1.81)**	-0.087 (-1.06)
β_5	0.386 (0.50)	2.32 (1.98)**	0.441 (0.29)
β_6	0.88 (1.98)**	0.300 (0.44)	0.338 (0.38)
β_7	0.024 (2.56)**	0.0106 (2.14)	0.035 (1.77)***
β_8	-0.098 (-1.25)	-0.478 (-4.15)***	-0.278 (-1.87)***
β_9	-0.0122 (-0.23)	-0.247 (-3.06)***	-0.093 (-0.09)
α_i	-2.32 (-2.05)**	-5.19 (-2.97)***	-3.81 (-1.68)***
Adj R ²	0.1015 [9.02]***	0.091 [1.11]***	0.082 [1.37]**

Notes: Terms within parentheses denote t-values, Terms within square bracket denote F-values, * implies significant at 10% level, ** implies significant at 5% level and ***implies significant at 1% level.

Table 4: Relationship of Audit Committee Characteristics with Firm's Financial Performance

Regression parameters	Estimated values of regression parameters		
	Equation 4	Equation 5	Equation 6
β_1	0.107 (0.49)	0.061 (0.54)	0.074 (0.34)
β_2	0.200 (0.94)	0.03 (0.53)	0.067 (0.33)
β_3	2.04 (2.37)***	0.640 (0.595)	0.257 (0.25)



β_4	1.86 (2.20)**	0.736 (1.85)	1.33 (0.44)
β_5	0.0072 (0.95)	0.052 (2.81)**	0.007 (1.66)**
β_6	-0.437 (-4.53)***	-0.152 (-1.90)**	-0.015 (-0.19)
β_7	-0.218 (-2.8)***	-0.042 (-0.75)	-0.143 (-1.57)
α_i	8.87 (6.3)***	2.58 (2.61)**	0.021 (0.02)
Adjusted R^2	0.0628 [7.7]***	0.0886 [1.75]*	0.0346 [1.35]*

Notes: Same as Table 3

Table 5: Relationship with Shareholders' Grievance Committee Characteristics and Firms' Financial Performance

Regression parameters	Estimated values of regression parameters		
	Equation 7	Equation 8	Equation 9
β_1	-0.044 (-0.35)	-0.049 (-0.68)	-0.052 (-0.32)
β_2	0.461 (1.18)	0.394 (1.89)	0.618 (1.39)
β_3	0.106 (2.19)**	0.056 (1.76)	0.247 (4.02)***
β_4	-0.434 (-3.79)	-0.099 (-1.65)	-0.216 (-1.47)
β_5	-0.009 (-0.65)	-0.065 (-2.96)**	-0.048 (-2.13)**
β_6	-0.22 (-2.82)***	-0.054 (-0.49)	-0.007 (-0.08)
α_i / α_0	7.26 (5.99)***	1.62 (1.76)	2.55 (1.66)*
Adjusted R^2	0.086 [7.63]***	0.055 [1.41]	0.0782 [1.45]*

Notes: Same as table 3



Table 6: Relationship with Remuneration Committee Characteristics and Firm's Financial Performance

Regression parameters	Estimated values of regression parameters		
	Equation 10	Equation 11	Equation 12
β_1	-0.150 (-1.31)	-0.065 (-1.42)	-0.103 (-1.13)
β_2	0.253 (0.55)	0.0187 (0.40)	0.693 (1.74)*
β_3	0.053 (0.68)	-0.031 (-0.48)	0.288 (0.32)
β_4	-0.472 (-4.13)***	-0.0172 (-0.49)	-0.00187 (-0.02)
β_5	-0.0099 (0.65)	0.0021 (0.37)	0.00603 (1.48)
β_6	-0.204 (-2.61)***	-0.0889 (-1.87)*	-0.151 (-1.68)
α_i/α_0	7.63 (6.39)***	0.583 (1.86)	0.348 (0.38)
Adjusted R ²	0.075 [7.42]***	0.0195 [0.92]	0.0231 [1.29]*

Notes: Same as Table 3

Table 7: Model specification for analysing the relationship between different Corporate Governance Characteristics and Firm's Financial Performance

	Fixed Effect [F Test]	Random Effect [B-P Lm Test]	Hausman Test	Type of Model
Board of directors' Dimension and Firm's Financial Performance				
Equation 1	6.78*	0	23.01*	Fixed Effect
Equation 2	7.02*	213**	45.74*	Fixed Effect
Equation 3	1.37**	0.02	16.09***	Fixed Effect
Audit committee's Dimension and Firm's Financial Performance				
Equation 4	7.61***	267.53***	9.95*	Fixed effect
Equation 5	0.99*	0.00	20.40**	Fixed Effect
Equation 6	1.35*	0.02	17.72**	Fixed Effect



Shareholder Grievance Committee Dimension and Firm's Financial Performance				
Equation 7	7.63***	264.73***	13.14**	Fixed Effect
Equation 8	1.17	0.00		Pooled OLS
Equation 9	1.76	0.00		Pooled OLS
Remuneration Committee's Dimension and Firm's Financial Performance				
Equation 10	7.57***	249.22***	17.27**	Fixed Effect
Equation 11	1.04	0.00		Pooled OLS
Equation 12	1.30	0.001		Pooled OLS

Notes: Same as Table 3

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CORPORATE SOCIAL RESPONSIBILITY: ANALYTICAL STUDY OF GLOBAL AND INDIAN PERSPECTIVES AND PRACTICES

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Abstract:

Corporate Social Responsibility (CSR) has occupied a prominent room in the domain of Management, Law, Sociology, Philosophy and Economics during last seventy five or more years. CSR is also known as Corporate Citizenship, Corporate Responsiveness. CSR has become a subject of serious research after A. B. Carroll's invention of CSR Pyramid during early 1980s. The fundamental theory of CSR is based on the premise that there is a symbiotic relationship between business and society. Society is the owner of all the factors of production and business acts as the agent of the society for converting the inputs into output. Primarily the business has to earn profit since profit is the oxygen of business without which no business can sustain. Next comes, business has to abide by the law of the land. Thirdly, ethics is the guide for decision making by the business under different situations and finally, business has to undertake philanthropic activities so that overall well being of the society is delivered. In India, the Companies Act, 2013 provides that certain categories of companies within the meaning of the said law are to mandatorily spend certain percentage of profit on CSR activities. CSR Reporting is compulsory in many countries in the globe which include Canada, Australia, Sweden, France, South Africa etc. This paper aims at throwing lights on the issues concerning meaning, scope and performance of CSR in the context of Multinational Corporations. It gives an outline of the meaning and significance of CSR initiative.

Key Words:

Corporate, CSR Pyramid, Business, Multinational Corporations, Ethics, Legal, Economic and Philanthropic



Introduction

Business is the subset of the society when the society itself is the universal set. Business cannot exist in vacuum but its existence is meaningful when it accepts the existence of the society. The relationship between business and society has been the interest of academics for decades influenced by the existing economic context at a specified point of time (Moir 2001)¹. The idea that business has responsibility towards the society gained prominence since 1950s and 1960s (Carroll 1999; Lantos 2001)². Over the decades, the concept of Corporate Social Responsibility (CSR) has continued to grow in importance and significance (Carroll & Shabana 2010)³. Business leaders, government officials and academics are focusing more and more attention to the concept of CSR (Reinhardt,

Stavins & Vietor 2005)⁴. CSR has become the subject of serious and considerable debate, commentary, theory building and research in the context of today's society. The essence of CSR is that business organizations do have certain responsibilities to the society beyond that of making profits for the shareholders since it draws all the necessary resources from the society only. Profit earning is the primary responsibility of business since no business can survive and sustain without the aid of profits. Today CSR covers a wide spectrum of subjects comprising of corporate governance, environmental protection, abiding by various laws and ethical issues. Milton Friedman, the noteworthy Nobel Laureate, of course, thinks that profit earning is the sole objectives of business (Friedman 1970)⁵. However, it is now a settled issue that CSR is very much concerned with the behaviour of business and over and above the legal and regulatory compliance. So far ever, there have been much legislation in the commercial world wherein it is established that business should definitely earn and increase profit but at the same time, it is imperative for the business to take care of the social causes and environmental issues. Under this backdrop and keeping this in forefront, CSR has emerged as an important responsibility of business in order to maintain its long term sustainability. A business cannot simply sustain simply on

¹Moir, L. (2001), what do we mean by Corporate Social Responsibility? Corporate Governance, Vol. 1, No. 2, pp. 16-22. In this article, the author explained the contextual relevance and meaning of the phrase 'Corporate Social Responsibility'

² Carroll, A. B.(1999) , Corporate Social Responsibility: Business and Society, Vol. 38, No. 3, pp. 268-295. A. B. Carroll is the pioneer and considered to be the stalwart in the field of research in Corporate Responsibility who is the father of CSR Pyramid. Lantos, G. P. (2001), The Boundaries of Strategic Corporate Social Responsibility, Journal of Consumer Marketing, Vol. 18, No. 7, pp. 595-630 explained the relationship between the business and society.

³ Carroll, A. B. & Shabana, M. Kareem (2010), The Business Case for Corporate Social Responsibility: A Review of Concepts, Research and Practice, International Journal of Management Reviews, British Academy of Management may be referred to for details of understanding justification for CSR initiatives.

⁴ The authors in their seminal works have explained vividly the contemporary relevance of the CSR in modern society.

⁵ Friedman, Milton (1970), The Social Responsibility of Business is to increase Profits, New York Time Magazine, p 32-33, 122, 126 is the genesis of academic debates as to whether business of business is the business or something else.



profit but it has to protect the surrounding environment for securing its own welfare and interest. The year of 2000 is of high importance and significance in the history of CSR practices in the globe when Mr. Kofi Annan, the then United Nations Secretary General launched the UN Global Compact (UNGC), the first CSR initiative at the international level. UNGC is the embodiment of ten principles concerning Human Rights, Labour, Environment and Anti-corruption. India is a developing Country and she suffers from not having provisions of basic necessities and it is the ultimate responsibility of the government to bring the economy on the egalitarian line which is the indicator of even distribution of national income and wealth . The Government has made laws and necessary provisions in the laws with regard to CSR initiatives and compliance thereof in the newly enacted Companies Act, 2013. This paper aims at discussing relevant issues and sketching an outline concerning global and Indian CSR practices and certain policy issues in the arena of CSR. The qualitative research methodology is the basis of the paper. CSR is emerging by leaps and bounds as an important and serious field of work in legal research. There is considerable debate in academics as to whether, CSR should be practiced on the basis of legal mandate or it should be a voluntary exercise as is currently being seen in the economically developed countries. It is indeed time consuming and long run episode for getting a conclusive answer to this note of interrogation and time would take care of this.

Scope, Functional Domain and Historical Backdrop of CSR:

CSR is not just a plan that needs to be implemented in order to serve the society

better but it is something more. CSR is a corporate governance action for generating social welfare. Many of us use CSR interchangeably with Corporate Social Performance (CSP) but they are altogether different in concepts. CSR is all about causing better living conditions of people whereas CSP refers to measurement of the performance of a company (Lau & Bhattacharya 2009)⁶. CSR is commitment of social initiative of business to behave ethically, legally and contribute to the cause of socio-economic development and sustainability of the society at large. CSR is to ethically take into consideration the social, economic and environmental issues and contribute to the socio-cultural and economic development of the country. Unless a business meets the needs and expectations of the customers, employees, shareholders and the community at large, it cannot survive and sustain in the long run. According to the Brundtland Commission Report, 1987, sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs⁷. This report inter-alia argues in

⁶ Lau, X & Bhattacharya, C. B. (2009), The Debate over Doing Good: Corporate Social Performance, Strategic Marketing Levers and Firm-Idiosyncratic Risk, *Journal of Marketing*, Vol. 73, No. 6, pp. 198-213 and in this work a vivid analysis has been made by the authors on Corporate Social Performance and a clear cut distinction has been made between CSR and CSP.

⁷ The **Brundtland Commission Report** (also known as **Brundtland Report**), from the United Nations World Commission on Environment and Development (WCED) was published in 1987. Its targets were multilateralism and interdependence of nations in the search for a sustainable development path



favour of CSR as the effective tool and weapon for sustainable development. The Canadian Government defined CSR in more explicit manner. According to it, "CSR is generally understood to be the way a company achieves balance or integration of economic, environmental and social imperatives while at the same time addressing shareholders and stakeholders expectations".⁸ It is again the World Business Council for Sustainable Development offers to state, "We define CSR as business commitment to contribute to sustainable economic development, working with employees, their families, the local community and society at large to improve their quality of life"⁹. This definition emphasized on CSR as a tool for sustainable economic development. The government of the United Kingdom provided that the government sees CSR as the business contribution to the sustainable developmental goals. Essentially it is about how business takes account of economic, social and environmental impacts in the way it operates. In the CSR Update, 2004, UK Government provides, 'We aim to provide support, guidance and a flexible framework to encourage and enable UK business to

behave responsibly to protect our environment. To facilitate action in this area we support innovation and sectoral sustainability strategies; produce guidelines and codes of practice; support services providing advice to business on a range of tools and techniques to improve its performance, including environmental reporting."¹⁰.

From the above discussions on definitional aspects of CSR, the following issues emerge:

CSR comprises of three words and they are corporate, social and responsibility. The term 'corporate' means organized form of formal business, the term 'social' means with the support of people everything is possible and the same is sustainable and finally the term 'responsibility' refers accountability between the business and society. CSR is a tool for sustainable economic development and it makes contribution to the overall wellbeing of the society and finally CSR has to take care of social, economic and environmental issues that make a civil society sustain and develop. In the context of contemporary relevance of CSR, we may refer to Prof. Dean David at Harvard Business School who invited the future business managers to heed of the responsibilities that rest on the shoulders of business leaders (Sector 2008). Bert Sector enunciated that roots of the present CSR movement dates back the period 1945-1960. Sector makes it a point that CSR was used as the means of aligning business interests with the defense of free-market capitalism against what was then

⁸ Corporate Social Responsibility (CSR) is defined as the voluntary activities undertaken by a company to operate in an economic, social and environmentally sustainable manner. Canada is one of the forerunners in the field of CSR and it uses CSR as a tool for socio-economic development of the Canadian Nation at large.

⁹The World Business Council for Sustainable Development (WBCSD) is a CEO-led organization of forward-thinking companies that galvanizes the global business community to create a sustainable future for business, society and the environment.

¹⁰ The UK Government gives very often its CSR update comprising of CSR Policy and the approach of the government towards the practice of CSR in the environmental and other allied matters.



perceived to be the danger of Soviet Communism (Sector 2008). Frank Abrahams, a former Executive with Standard Oil Company (Now Exxon), New Jersey introduced concern about management responsibilities in a complex world (Abrahams 1951)¹¹. Abrahams asserted that with the advent of professionalism in management, companies had to think not just about profits but their employees, customers and society at large. 1953 is a red letter day in the history CSR when Howard R. Bowen came out with his famous book, 'Social Responsibilities of Businessman (Bowen 1953). This is the formal foundation of today's CSR. Thereafter came into the picture Prof. Theodore Lavitt and Milton Friedman who were considered to be the staunch opponents of CSR philosophy. Theodore Lavitt thought that social concerns and general welfare were not the responsibility of business but of the government and that Business's job was to take care of more material aspects of welfare (Carroll & Shabana 2010). Finally A. B. Carroll appeared to be harbinger of the theory of CSR what we have today, Carroll's (1979, 1991) four parts definition of CSR view CSR in four dimensional domain and they are economic, legal, ethical and philanthropic. These responsibilities are the expectations placed on the companies by corporate stakeholders and the society as a whole (Carroll & Shabana 2010).¹² It may

therefore appear that CSR is the embodiment of all that four core imperatives that a business has to discharge as responsibilities towards the society. CSR refers to corporate social responsibility, corporate responsibility and corporate citizenship and all these three phases are used interchangeably. How CSR is practiced in a company depends upon the effectiveness of the corporate governance. Corporate governance specifies the rules of business decision making that apply¹³ to the internal mechanism of the companies. The set of norms and laws shape the relationship among board of directors, shareholders and managers as well as resolve agency conflicts. (Gill 2008)¹⁴.

Objectives of the Study

Objective of the present study is to examine the degree of global and Indian CSR perspectives and practices. A Couple of hypotheses have been developed in order to arrive at the logical conclusion. CSR is a vast field of study and it shall not be possible to cover every aspect of CSR in this paper. The scope of this paper is to make us understand the relevance of global and Indian practices based on elements contained in Carroll's CSR pyramid.¹⁵ The CSR pyramid of Carroll shows

¹¹ Frank Abrahams was the chairman of the Board of the Standard Oil Company in early 1950s had given a call to the young managers for working towards CSR.

¹² Carroll & Shabana (2010) have dealt with the business case for CSR in their seminal work entitled " The Business Case for Corporate Social Responsibility: A Review of Concepts, Research and Practice"

¹⁴ It may be mentioned that prominent NGOs in the CSR field such as Business for Social Responsibility are providing consulting services as how to frame strategy for companies to structure the board and managerial units in accordance with CSR principles.

¹⁵ A. B. Carroll (2006) has shown the positional dimensions of four constituents of CSR in a pyramid. At the bottom of the pyramid, there is Economic Responsibilities, in the second rung of the pyramid, there is Legal Responsibilities,



the relevance of profitability, legality ethical issues and finally philanthropic dimension in terms of how to become a good corporate citizen. The objectives of the study are based on the introductory background of the subject.

Literature Review

In order to understand the CSR problems and prospects, we need to undertake survey of the existing literature on the given field of study. Over a considerable period of time, there was academic debate as to why the companies should at all take into consideration social welfare aspects and it was argued that social responsibility of business is to increase its profits (Friedman 1970).¹⁶ Against the view of Milton Friedman, it was debated that CSR can be much more than a cost, a constraint or a charitable deal -it can be a source of opportunity, innovation and competitive advantage (Porter & Kramer 2006).¹⁷

Emerging markets are full of risks and characterized by either bad or weak public governance or administration, lack of public transparency, high level of bribery and corruption, poor records of human rights, inadequate of environmental safety and labour standards and high levels of poverty and inequality and therefore sustainability of business faces the note of interrogation (Nelson 2006).¹⁸ It is to keep in view that labour standard issues can damage an image of a company both nationally as well as internationally and Nike's Case in early 1990s is an example (Litvin 2003).¹⁹ In this case, it was reported that labourers were very poorly paid and they were unable to meet their necessities with such wages and Nike was exposed to negative criticism worldwide and it lost its corporate reputation. However, Nike corrected itself by taking care of the negativity including launching ' Re-Use-a Shoe Project' to recycle old, unwanted footwear (McDonald, London & Hart 2002).²⁰ Coca-Cola Company

Ethical Responsibilities are placed in the third rung and at the apex, there is Philanthropic Responsibilities.

¹⁶ Friedman, Milton (1970) argued in his paper, "The Social Responsibility of Business is to increase its profits", published in the New York Times Magazine, September 13, 1970 that it is discretionary on the part of the business with regard to contributing to the cause of social welfare. He categorically advocated that business of the business is to make profits and only profits.

¹⁷ Michael E. Porter and Mark R. Kramer , the management strategists of 21st Century argued in the paper, "Strategy & Society: The Link between Competitive Advantage and Corporate Social Responsibilities", published in the Harvard Business Review in December, 2006, that CSR is a tool of innovation and opportunity and not merely a charitable and philanthropic aspect of profit sharing with the society.

¹⁸ The picture of negative corporate governance was sketched by Jane Nelsen (2004) in the paper entitled " Leadership, Accountability and Partnership: Critical Trends and Issues in Corporate Social Responsibility", Report No 1 (Cambridge, Mass.: Kennedy School of Governance, Harvard University.

¹⁹ Daniel Litvin used the example of Nike Footwear Case in his paper entitled, " Empires of Profit: Commerce, Conquest and Corporate Responsibility", New York: TEXERE 2003. In this paper, it is discussed how a multinational company failed to take into cognizance the relevance of fair dealings with the labour force and consequence thereof.

²⁰ McDonald, Heather, London, Ted & Hart Stuart (2002) included Nike's Case in their paper entitled "Expanding the Playing Field: Nike's World Shoes Project (Washington, DC.: World Resource



implemented a programme to tackle HIV/AIDS in workplaces across the continent of Africa and this is a genuine social commitment of a company in discharging CSR.²¹

From the above analysis, it emerges that business and society is complementary to each other and there is a symbiotic relationship between them. Profit is no doubt the motivational force for the business but it must take into consideration ethical, social and philanthropic perspectives in order to have a situation of 'Live and Let Live'. In the global arena, Multinational Corporations (MNCs), play a pivotal role in CSR imperatives and the domestic companies in many countries contribute adequately to the cause of CSR.

CSR Practices at Global and National Levels

The main objective of the present study is to understand the global and national practices of CSR. It also needs to understand the vision, mission and objectives of the corporate firms towards CSR. From the available secondary sources of information and data, we would like to portray the sketch of CSR practices and perspectives of the following companies forming the part of our research sample.

1. WIPRO: WIPRO, an Indian MNC, think that first and foremost responsibility of an organization is to run its business ethically and compliance with the law in letter and spirit. WIPRO practices in (i) unyielding

integrity in every aspect of business (ii) treating people everywhere fairly and with respect-at the workplace as well as communities outside and (iii) demonstrating ecological sensitivity in thought and action. According to Mr. Azim Premji, the Chairman of Wipro Limited (1998), CSR aims at fundamental social development and in Indian context, it is to achieve the objective of to make a just, humane and equitable society.²²

2. Tata Motors: According to Motors Annual Report 20014-2015, the company has launched a host of projects as its CSR initiatives under "health, employability, education, rural development, environment and drinking water projects. The Chairman of the Company maintains that Tata Motors means the society and the Society means Tata Motors.²³

3. TISCO: TISCO's CSR initiatives include health, sanitation, education, rural development, sports, livelihood etc. in order to uplift the weaker section of the society. Top management of the company is engaged in framing the corporate strategy for discharging CSR imperatives of the company. The Annual Report 2014-2015 of the company provides that TISCO discharges its CSR since inception voluntarily when there was no legal and regulatory compliance.²⁴

Institute) wherein the Causes of fall and rise of Nike was academically dealt with in vivid details.

²¹ This was retrieved from http://www.the-coca-colacompany.com/citizenship/hiv_aids.html on 30th September, 2014

²² For details, may please refer to the Board CSR Charter and Policy of the Company.

²³ For details, CSR Policy and Annual Reports of the company may be referred to.

²⁴ For details, the CSR Policy document and Annual Reports of the company may be referred



4. Aditya Birla Group: In the CSR Update 2015 of the Group, it states that the vision of the group is to actively contribute to the social and economic development of the communities in which the group operates. The Group's CSR initiatives specifically include undertaking the projects concerning education, health and infrastructure development.²⁵

5. SAIL: Steel Authority of India Limited, one of the Public Sector giants, does have a very comprehensive CSR policy and initiative. According to the Annual Reports of the Company and CSR Update, as on date, SAIL has established 54 Primary Health Centres, 12 Reproductive & Child Health Centres, 17 Hospitals and 7 Super Specialty Hospitals and providing specialized health care to more than 30 million people. Moreover, there is substantial amount of allocation of resources to education, connectivity, water & sanitation, vocational training, sports and preservation of Art and Culture.²⁶

6. Coca-Cola Company: It needs hardly any mention that Coca-Cola is a MNC giant having business units all over the world. It has huge network with the bottling partners across Africa Continent and is running a programme to tackle HIV/AIDS in its workplace. The strategic management team

is engaged in CSR Policy framing and documentation.²⁷

7. Unilever: Unilever is ceaselessly engaged in identifying new products and markets in low income communities in the world. Its CSR objectives include providing quality product at the affordable price to the marginal income group of people in the society.²⁸

8. Vodafone: Vodafone has created a Community Phone Service Programme in South Africa to meet connectivity needs of the country at the affordable price in order to reach the unreached.²⁹

9. Virgin Atlantic: On February 24, 2008, Virgin Atlantic became the first commercial aeroplane operator to fly a plane partially powered by bio-fuels. But there is a debate as to whether bio-fuels can curb global warming.³⁰

10. General Motors: In 2002, General Motors launched the Autonomy Project of \$1 billion

²⁵ Mrs Rajashree Birla, the Chairperson, CSR Initiatives takes personal interest in undertaking social projects in order to response to the CSR commitment of the Group as a whole.

²⁶ For further details, it may refer to the CSR Policy Document and Annual Reports of the Company.

²⁷ May please refer to the CSR Policy Document and CSR Update 2015

²⁸ May refer to Hart L. Stuart, Capitalism at the Crossroads: Aligning Business, Earth and Humanity for further details.

²⁹ May refer to Jones W. Ian, Pollitt G. Michael & Bek David, Multinationals in Communities: A Social Capital Approach to Corporate Citizenship Projects (Basingstoke: Palgrave Macmillan, 2007)

³⁰ For details, may refer to Feng Zhang's Corporate Social Responsibility in Emerging Markets: The Role of MNCs, Foreign Policy Centre, United Kingdom



initiative to reinvent the automobile around hydrogen fuel cell technology.³¹

Multinational Corporations (MNCs) are under scanner to know as to whether they demonstrate socially responsible behaviour in the global operations. (Janes 2005).³² MNCs take CSR initiatives across the world to promote fundamental ethics and universal values (Bennett 2002; Mohan 2006).³³ The MNCs are taking many policy decisions for bringing about harmony between the culture of the host countries and the culture of the MNCs-both at the national and global levels (Jone, 2005) including international guidelines, multilateral agreements and trade treaties like North American Free Trade Agreements (NAFTA), the World Trade organizations (WTO), Association of South East Asian Nations (ASEAN)(Mohan 2006). After going through the discussion on the global perspectives and practices of CSR, it may be worthwhile to assert that CSR is nothing but sacrificing profits in the social interest (Elhauge 2005).³⁴ It may be put

forth in another word that corporate organizations are imperatively required to share their profits with the society in order to ensure social wellbeing. Besides the domestic companies, MNCs have been playing a significant role in reducing disparity between the haves and have-nots through CSR policy and practices. In this context it may be asserted that law has prominent role in implementing CSR initiatives in any country including India.

Legal Aspects of CSR

CSR is linked with different areas of law including international law, corporate law, commercial law, law of tort and contract, procedural law, labour law, environmental law and criminal law and all of these laws contribute to the development of CSR (Lambooy 2014).³⁵ In India, the Companies Act, 2013 provides for mandatory CSR practice of certain categories of companies. CSR directly or indirectly cannot work fruitfully without legal support or rather CSR cannot exist in legal vacuum. Legal support to CSR makes it implemented easily. All the major countries across the world do have good amount of CSR Practices. For instance, United States of America, United Kingdom, Canada, France, Japan, Germany and many more countries including India are having direct or indirect legal backing in CSR practices. In most of the countries, disclosure of material information in the Annual Reports of the companies is

³¹ For details , may refer to Hat, Stuart, *Capitalism at Crossroads, Aligning Business, Earth and Humanity* (Upper Saddle River, New Jersey: Wharton School Publishing, 2007)

³² For details, it may refer to J Bennett's paper " Multinational Corporation, Social Responsibility and Conflict", *Journal of International Affairs*, Vol. 55, No. 2, pp. 393-412, retrieved from Proquest database

³³ May refer to A. Mohan's "Global CSR Management in MNCs", *Journal of Business Strategies*, Vol. 23, No. 1, pp. 9-33, retrieved from Proquest Database.

³⁴ May refer to Einer Elhauge (2005), *Corporate Manager's Operational Discretion to Environmental Protection and Social Responsibility of Firms*,

eds., Hay Bruce, Robert Stavins and Richard Vietor, Washington , DC: Resources for the Future.

³⁵ May refer to Tineke Lambooy's(2014) seminal work, "Legal Aspects of Corporate Social Responsibility", 30(78), *Utrecht Journal of International & European Law*.



mandatory and this is practiced in compliance with the transparency and fairness.

Conclusion

Law has definitely a prominent role in promoting CSR but CSR practice should go beyond law (FICCI 2012).³⁶ Though it is still a debatable issue as to why companies shall be expected to go beyond in the context of CSR initiation and implementation and the forthcoming decades perhaps shall be needed to resolve this issue but it is invariably the law that makes it more simple to answer the problems of resource allocation and sharing of corporate surplus with the society in respectful manner. Moreover, legal mandates come into play when voluntary options fail. People of economically more advanced countries are more educated and consequently in general ethics and morality prevent them from committing any wrong but less developed countries are in general less disciplined and therefore legal support in such cases is indispensable perhaps. In this paper, we have examined the definitional domain, historical backdrop, support of literature survey for understanding spirit and essence of CSR, contemporary status of CSR practices by MNCs and allied issues concerning CSR imperatives. From the overall analysis, fact, information and methodology adopted, it may be asserted in the final conclusion that CSR is the bridge between the companies

³⁶Federation of Indian Chamber of Commerce and Industry advocates that the companies should not wait for legal mandate for CSR imperative. The companies should volunteer themselves to launch CSR initiatives before law compels for adoption of CSR imperatives for the cause of social wellbeing in general.

and society and it acts as a powerful tool for maintaining economic balance in between the companies and the underprivileged in the society and therefore, civil society acknowledges the constructive roles which are being played by the companies through the CSR process and the companies should use CSR as a the medium to reach the unreached in the civil society.

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EVALUATING EFFICIENCY OF INDIAN LIFE INSURANCE COMPANIES USING DATA ENVELOPMENT ANALYSIS

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Abstract:

In last one decade, the life insurance companies operating in India have made a significant progress in terms of savings mobilization and resource generation in Indian financial market. In view of reforms of the Indian life insurance sector, the relative performance of life insurance companies is of interest to both academicians-researchers and policy makers. Since the insurance sector was deregulated a few years back, number of players in the insurance sector is 24 comprising 23 private life insurers and one public life insurer. The present paper intends to use Data Envelopment Analysis (DEA) to compare the efficiency of all 24 life insurance companies operating in India for the year 2015-16 using a three input-three output framework. Based on existing literature, the input variables selected for the paper are: commission expenses, operating expenses and paid up equity capital, while the output variables are: net premium, total benefits paid and income from investment. The study mainly estimates the technical efficiency (TE) scores of all 24 life insurers using Charnes Cooper Rhodes (CCR) (1978) envelopment model and identifies the efficient life insurers in the year 2015-16. The study also decomposes technical efficiency score into pure technical efficiency and scale efficiency using Banker Charnes Cooper (BCC) (1984) envelopment model to find out the impact of managerial performance and scale of operation on overall efficiency of life insurance companies.

Key Words:

Data Envelopment Analysis, Life Insurer, Pure Technical Efficiency, Scale Efficiency, Technical Efficiency



1. Background of the Research

Life insurance protects uncertainty and risk where a certain sum of money is agreed upon to be given by the insurer to the insured or his/her nominee in the event of death of the insured or upon maturity of the policy against payment of premium as per the terms of insurance. Mainly three persons are involved in a life insurance contract - insurer, insured and the beneficiary who is supposed to receive the insurance claim in case of death of the insured. The sum assured and other terms and conditions of a policy is generally decided based on risk assumed by the insured. Hence, price of a policy and premium payable is usually decided by the actuaries based on estimated claims to be settled by the insurer (Saha, 2013). Previously, Indian life insurance was monitored by the Insurance Act 1938 which has been replaced by Insurance Regulatory Development Authority (IRDA) Act, 1999. Being one of the important financial intermediaries in Indian financial market, the main role of life insurance companies are mobilisation of resources from small savers and investing the same in productive purposes and thereby facilitating capital generation in Indian economy stimulating economic development.

Life insurance industry started its operation in India with the establishment of Life Insurance Corporation of India Ltd. (LIC) in 1956. It became the only public sector company in India and it is the only public sector company in life insurance sector still now. It enjoyed monopoly in Indian life insurance market till 2000. During this tenure, it extended its operations in 12 foreign countries to fulfil insurance needs of non-resident Indians. However, insurance

industry opened its avenues to the private players only after economic reforms that initiated in the year 1991. At that juncture, Malhotra Committee submitted their report in 1994 and Insurance Regulatory Development Authority Act was enacted in the year 1999. In pursuant to this Act, in India Insurance Regulatory Development Authority (IRDA) was set up in the year 2000 in order to liberalise and control insurance market efficiently. Truly speaking, working licenses offered to the private players by IRDA to operate in Indian life insurance market diluted monopolistic attitude of the LIC. Private life insurance companies effectively started their operation in the year 2001. They are currently working in a liberalised environment under insurance sector reforms era and most of them have formed joint ventures with recognised foreign players across the globe. As a result, the competition has become stiff in Indian insurance market (Sinha, 2012a). However, 23 private life insurance companies are currently operating in India apart from LIC.

2. Research Problem and Research Questions

Life insurance organisation in India is very important financial institution in Indian financial system in order to mobilize insurance premium collected from the household sectors into investment in Indian financial market. In fact, Life insurance companies in India play a significant role as financial intermediaries in financial market. Enormous amount of premium collected by life insurance companies including public as well as private are invested into different sectors as per investment portfolio. There is no denying to the fact that success of Indian economy is dependent upon the growth prospect of Indian life insurance sector with



their savings mobilisation and investment opportunities to some extent. Hence, life insurance companies in India are efficiently utilising their resources in developing their growth that accelerate to the economic growth of the nation. In view of the development in the life insurance sector in the last decade, it is important to study the recent financial performance of the individual player in the insurance sector (Sinha & Chatterjee, 2011).

Research Questions

Based on the background of the research, it is imperative to analytically study the current status of efficiency of each life insurance company operating in India in addressing the following research questions:

- (i) Are life insurance companies operating in India for the year 2015-16 financially efficient?
- (ii) What are the major causes behind financial inefficiency of life insurance companies?
- (iii) Is the scale of operation of life insurance companies appropriate?
- (iv) How to identify the best practising life insurance companies in Indian life insurance sector?
- (v) Who are the worst performers in life insurance sector in India during 2015-16?

In order to explore the aforesaid research questions and develop an underlying concept on efficiency of life insurance companies, a review of literature has been made in the following section.

3. Review of Literature and Research Gap

Efficiency analysis of life insurance companies has always been an important area of research in the academic filed as well industry. The current paper discusses a few researches on this issue. The study of efficiency in life insurance sector has started long back. Cummins et. al. (1999) in their study, investigated into the efficiency change of life insurance companies in the United States of America (USA) as a result of mergers and acquisitions (M&A). Efficiency of life insurance companies in the USA over the period 1988 to 1995 was measured with the help of Data Envelopment Analysis (DEA). Malmquist indices were also calculated to measure changes of efficiency and productivity over that time. A regression analysis is also done to analyse the impact of M&A on efficiency change of life insurance companies. It is observed that target firms had higher efficiency as compared to those firms which were not subject to M&A.

Boonyasai et. al. (2002) analysed the impact of liberalisation and deregulation in 4 life insurance markets in Korea, Philippines, Taiwan and Thailand total efficiency and productivity of the life insurance companies. With a data of 20 years (1978-1998), efficiency scores were calculated. Malmquist Index was also applied to understand productivity changes after deregulation. Productivity of life insurance companies in Korea and Philippines were better than other two markets. Diacon et. al. (2002), on the other hand, analysed the relative performance of 454 life insurers in 15 European countries for the period of 1996-99. Pure Technical Efficiency (PTE), Scale Efficiency (SE) and mix efficiency of the companies are estimated using DEA. The study looked into county-wide differences in



efficiency of the firms. It was observed that efficiency of the companies increased till 1998. Companies in the United Kingdom (UK), Spain, Sweden and Denmark were observed to get higher efficiency as compared to the companies in other countries.

In one of the recent studies, Hsiao (2006) measured performances of 25 life insurers at Taiwan during the period 1998-2002. Difference between domestic and foreign insurers in terms of their efficiency was analysed as well. Application of DEA showed that only 2 out of 25 companies were efficient. The Mann-Whitney test revealed that there was no significant difference in the efficiency of domestic and foreign players. Barros and Obijiaku (2007) in their study investigated technical efficiency of 10 Nigerian insurance companies for the period of 2001 to 2005. Charnes Cooper Rhodes (CCR), Banker Charnes Cooper (BCC), cross-efficiency Data Envelopment Analysis (DEA) and super-efficiency models were applied to estimate efficiency. It was observed that 80% of the insurer was efficient and was operating at Constant Returns to Scale (CRS). Chen et. al. (2007) studied the effect of regulatory changes and entry of foreign players on efficiency of Chinese life insurance companies. They applied DEA-BCC to estimate technical efficiency and Malmquist Index to check efficiency change and technical progress. The result showed that efficiency of Chinese life insurance companies significantly fell in the year 2005. Kasman & Turgutlu (2007) investigated the technical efficiency of 28 life insurance companies using the data covering a period from 1999 to 2005. The paper applied DEA, constrained DEA and Stochastic Frontier Analysis (SFA) to analyse efficiency of Turkish life insurers. Impact of ownership and size of

the company on its efficiency was also measured. Significant differences of efficiency among the three approaches of analyses were also tested. High level of efficiency existed in the industry. Domestic firms were more efficient than their foreign counterparts and large sized firms are better performing firms. Efficiency of life insurers under the three approaches was significantly different as per Mann-Whitney test.

Efficiency of life insurance companies based on different approaches has been a major focus in current studies. Lee & Kim (2008) in their study measured and decomposed the relative efficiency of Korean life insurers using DEA (CCR and BCC), Slack Based Measures (SBM) and super-efficiency models with an input-oriented approach. They observed high efficiency of Korean life insurers. Eling & Luhnen (2009) tried to make a comparative study of the efficiency of 6462 insurers comprising both life and non-life insurers. Application of DEA on the collected data showed that efficiency of non-life sector is relatively poor as compared to life insurance companies. Lin et. al. (2010) used DEA to measure business efficiency of life insurers at Taiwan for a period of 2005 to 2009. Average efficiency of life insurance companies were found to be 65% which was mainly due to managerial underperformance.

3.1 Research Gap

It is observed that there are quite a few studies exploring efficiency of life insurance companies. As life insurance companies play a significant role in channelling resources of the small savers and take part in economy building process, how effectively they are utilising their resources generating output has always been an important area of



research. Existing studies not only view efficiency of life insurance companies from different approach, but also try to synthesise the effect of ownership structure or firm size on their relative efficiency. Impact of deregulation or merger prospect on efficiency of the life insurance firms have also been looked into with an analytical approach. However, efficiency studies on life insurance sector are comparatively less in India. Recent picture of efficiency in Indian life insurance sector has not been captured through literature review, so far. Causes of financial inefficiency and probable measures of solution have also not been discussed in existing literature, so far. Keeping in view this gap in existing literature, an attempt has been made to explore the efficiency of all 24 life insurance companies operating in India for the year 2015-16 using Data Envelopment Analysis (DEA) model in addressing the following objectives for the current study.

4. Objectives

The objectives of the current study in order to address the research gap are:

- (i) To evaluate the efficiency of Indian life insurance companies (Refer to Section 6.1);
- (ii) To explore the causes of financial inefficiencies of Indian life insurance companies (Refer to Section 6.2);
- (iii) To recommend changes in the scale of operation of the inefficient life insurance companies (Refer to Section 6.3);
- (iv) To rank efficient life insurance companies (Refer to Section 6.4); and
- (v) To discriminate inefficient life insurance companies based on their

level of inefficiency (Refer to Section 6.5).

5. Methodology

5.1 Searching the Underlying Concept and Selection of Input and Output Variables

The study is exploratory in nature and based on secondary data. An attempt has been made initially to understand the operation of life insurance businesses in India from books and research papers. It has been observed that efficiency of an organisational unit is a measure of output produced per unit of input. Hence, with a view to analysing efficiency of life insurance companies currently working in India, it is utmost important to identify a reasonable number of appropriate input and output variables of each company under consideration. Based on past researches in this field, three inputs and three output variables have been selected which may be considered to be very pertinent in life insurance industry. Now, there is a thumb rule offered by Cooper, et. al. (2007) to find out reasonable number of inputs and output variables in a particular study as follows:

$n \geq (p \times q)$ where, n = number of units, p = number of inputs, q = number of outputs.

Here, number of units called decision making units (DMUs) whose efficiencies are to be calculated is 24 while number of inputs and outputs are three. Hence, $24 > (3 \times 3)$, the equation holds, and three-input and three-output may be accepted for estimating efficiencies of the LICs. Specific inputs and outputs selected for the current



study based on existing studies are as follows:

5.1.1 Input Variables

- Commission (Diacon, Starkey & O'Brien, 2002)
- Operating Expenses (Ennsfellner et. al., 2004)
- Paid-up Equity Capital (Bawa & Ruchita, 2011)

5.1.2 Output Variables

- Net Premium Collected [*Gross Premium - Reinsurance ceded*] (Abidin & Cabanda, 2011)
- Total Benefits paid by the LICs to the Policyholders (Cummins et. al., 1999)
- Income from Investment [*Interest or dividend from investment + Profit on sale or redemption - Loss on sale or redemption + Gain on revaluation of fair value + Amortisation of premium or discount on investment*] (Sinha, 2007)

5.2 Data Set for the Current Study

5.2.1 Nature of Data and Data Source

The current study is based on secondary data. The data has been collected from Handbook on Indian Insurance Statistics 2015-16 published by the IRDA.

5.2.2 Data Unit

The current study attempts to evaluate efficiencies of all 24 life insurance companies called DMUs currently operating in India. They are as follows:

Table-1: Life Insurance Companies in India

No.	Life Insurance Companies	No.	Life Insurance Companies
1	Aegon Life Insurance (Aegon)	13	IDBI Life Insurance Company Ltd. (IDBI Federal)
2	Aviva Life Insurance (Aviva)	14	IndiaFirst Life Insurance Company (IndiaFirst),
3	Bajaj Allianz Life Insurance (Bajaj Allianz)	15	Kotak Life Insurance (Kotak Mahindra)
4	Bharti AXA Life Insurance (Bharti AXA)	16	Life Insurance Corporation of India Ltd. (LIC)
5	Aditya Birla Sunlife Insurance (Birla Sunlife)	17	Max Life Insurance (Max Life)
6	Canara HSBC OBC Life Insurance (Canara HSBC)	18	PNB Metlife
7	DHFL Pramerica	19	Reliance Nippon Life (Reliance Nippon)
8	Edelwiess Tokio Life Insurance (Edelwiess Tokio)	20	Sahara India Life Insurance Corporation Ltd. (Sahara India)
9	Exide Life Insurance (Exide Life)	21	SBI Life Insurance Company (SBI)



			Life)
10	Future Generali India LIC Ltd. (Future Generali)	22	Shriram Life (Shriram)
11	HDFC Life Insurance (HDFC Standard)	23	Star Union Dai-ichi Life Insurance (Star Union Dai-ichi)
12	ICICI Prudential Life Insurance (ICICI Prudential)	24	Tata AIA Life Insurance Company (TATA AIA)

(Source: IRDA Handbook on Indian Insurance Statistics 2015-16)

5.2.3 Study Period

The data on aforementioned input and output variables for all 24 companies have been collected only for the year 2015-16.

5.3 Analytical Technique used for Collected Data

There are different techniques for measuring efficiency of financial institutions. Out of several techniques, Berger & Humphrey (1997) in their study observed that Data Envelopment Analysis (DEA) is the most effective frontier technique in analysing efficiency of financial institutions. DEA is a non-parametric mathematical approach that does not call for functional specification of the existing production technology (Favero & Papi, 1995). DEA considers a few inputs and output variables of the Decision Making Units (DMUs) under study and estimates a linear shaped frontier using linear programming

optimisation to find out relative efficiency score of the underlying DMUs (Sinha, 2012). Efficiency of a DMU is relative as it is estimated keeping in view the efficiency of best-practising DMUs that lie on the frontier. The frontier envelops other inefficient units. There are two approaches of conducting DEA: *input-oriented approach* and *output-oriented approach*. However, the current study is based on input-oriented approach, whose objective is equi-proportionate reduction in inputs to produce a standard output of the efficient units.

5.3.1 Data Envelopment Analysis (DEA) Model

Based on the assumption of underlying technology and scale of production, there are two basic models of DEA, namely Charnes, Cooper & Rhodes (CCR) model and Banker, Charnes, & Cooper (BCC) model. The model developed by Charnes, Cooper & Rhodes (CCR) (1978) assumes Constant Returns to Scale (CRS), while the model designed by Banker, Charnes, & Cooper (BCC) (1984) assumed Variable Returns to Scale (VRS). According to both the models, a DMU is efficient with Technical Efficiency (TE) score of 1 and inefficient if TE is less than 1.

5.3.1.1 CCR Model

Under CCR model, TE is known as Overall Technical Efficiency (OTE). Here, the underlying assumption about scale of production is CRS. The input-oriented measure of technical efficiency of any firm under CRS requires the solution of the following Linear Programming (LP) problem:

Min θ , subject to following constraints: θx_o ,
 $- \lambda X \geq 0$, $\lambda Y \geq y_o$, and $\lambda \geq 0$. Where,



$TE = \theta = X\lambda / X_0$, where $X\lambda$ is optimum minimum input and x_0 is actual input and $Y\lambda$ is optimum standard output and y_0 is actual output. Now, for radial contraction of input, X_0 should be multiplied by $\theta = 1/\mu$. If the objective function is to minimize θ , it would ensure maximization of μ resulting in maximum radial contraction of input keeping the output at the same level. Here, the first constraint means the maximum radial contraction of observed input (θx_0) should be greater than or equal to the optimised value of input ($X\lambda$) for each unit in the sample. On the other, the second constraint says that the maximum output ($Y\lambda$) should be greater than or equal to the observed value of output (y_0) for any unit in the sample. If θ is equal to 1, then for the concerned DMU, radial contraction is not necessary as the DMU is already operating at the minimum level, thereby making it an efficient DMU. On the other hand, when θ is less than 1, radial contraction is required to bring the observed input to the minimum output level.

5.3.1.2 BCC Model

Under BCC model, the measure of efficiency is known as Pure Technical Efficiency (PTE). PTE is the efficiency of a DMU attributable to managerial or environmental factors. Here, the underlying assumption about scale of production is VRS, which may either Increasing Returns to Scale (IRS) or Decreasing Returns to Scale (DRS). The input-oriented measure of technical efficiency of any firm under VRS requires the solution of the following LP problem:

Min θ , subject to the following constraints:
 $\theta x_0 - X\lambda \geq 0$, $Y\lambda \geq y_0$, $\lambda \geq 0$, $e\lambda = 1$.

The convex hull of BCC model envelops the data more tightly than the conical hull of CCR model. Hence, the efficiency scores under BCC are more than that of CCR. It may so happen that DMUs with less than 1 OTE score attain PTE=1 in BCC model. As the underlying assumption is VRS, PTE less than 1 is completely due to managerial underperformance of the DMUs.

5.3.2 Measure of Scale Efficiency

Appropriateness of the scale of operation is captured through Scale Efficiency (SE). Truly speaking, OTE is decomposed into PTE and SE. It can be expressed mathematically: $OTE = (PTE \times SE)$. Thus, the estimate of SE for a DMU can be obtained by dividing its OTE by its PTE [i.e. $SE = (OTE \div PTE)$]. The measure of SE is attributable to the appropriateness of the scale of operation of the DMU. Thus, Overall Technical Inefficiency (OTIE) [i.e. (1-OTE)] may be segregated under Pure Technical Inefficiency (PTIE) [i.e. (1-PTE)] due to managerial underperformance and Scale Inefficiency (SIE) [i.e. (1-SE)] due to inappropriate scale of operation.

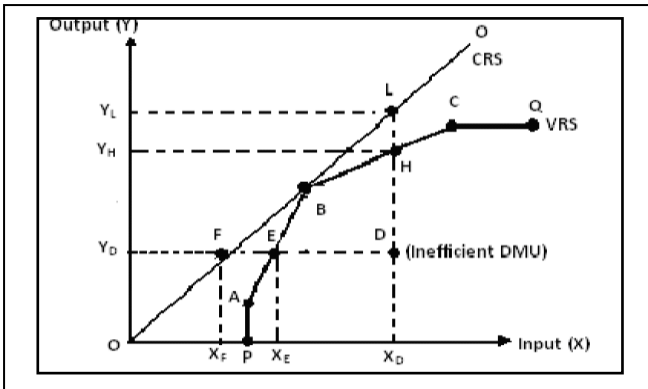
5.3.3 Returns to Scale

The profitable scale of production is Constant Return to Scale (CRS) where proportionate increase in inputs result in same proportionate increase in outputs. At this scale of operation, cost is minimised and revenue is maximised. However, in reality, DMUs may operate in Increasing Returns to Scale (IRS) (proportionate increase in inputs resulting in more than proportionate increase in outputs) or Decreasing Returns to Scale (DRS) (proportionate increase in inputs resulting in less than proportionate increase in outputs). A DMU may operate at IRS or DRS in the



short run, while it would strive to attain CRS in the long run. Hence, it may change its operating strategy to scale up or downsize its operations (Kumar & Gulati, 2008). Returns to Scale (RTS) of a particular DMU can be ascertained from the following figure.

Figure-1: Measure of Scale Efficiency



(Source: Kumar & Gulati, 2008)

In the above figure, efficiency frontier as per CCR model is OFBLO, while efficiency frontier as per BCC model is PAEBHCQ. The point, at which production frontier of CCR is tangent to that of BCC, is known as the point of most productive scale size. Hence, the DMU B follows CRS. At this point, the envelopment line passes through origin. Hence, the intercept of the efficient frontier (λ) is equal to zero. On the other hand, DMUs at point A and E are following IRS. If the tangents of these two points are extended, the intercept will be negative ($\lambda < 0$). A reverse situation is observed at point H and C, where the DMUs are following DRS ($\lambda > 0$) (Kumar & Gulati, 2008).

5.3.4 Discrimination of Efficient Units

Efficient life insurers are ranked based on the frequency in which they appear in the reference set of inefficient life insurers (Chen & Yeh, 1998). If the frequency is high, the concerned life insurer has exemplary operating efficiency and likely to remain so until there is a sudden change in environmental factors. However, efficient life insurers with lesser frequency in the reference set of inefficient life insurers are marginally efficient or efficient by chance. Operating practices of those companies may not be followed by the inefficient life insurers.

5.3.5 Measure of Super-Efficiency

In order to get more conclusive evidence on the ranks of efficient DMUs, alternatively super-efficiency scores of individual DMUs are calculated using the method prescribed by Anderson & Peterson (1993). As per this method, the DMU under consideration is excluded from the reference set while calculating its efficiency score. Naturally, DMUs with OTE=1 will have a super-efficiency score of more than or equal to 1. It will help to appropriately rank all the DMUs under consideration. The input-oriented measure of super-efficiency for DMUs under CCR requires solution of the following LP problem:

Min θ , subject to the following constraints:
 $\theta X_0 \geq \lambda X_s$; $Y_0 \leq \lambda Y_s$; X_0, Y_0 not included in X_s and Y_s . Where, θ is Super-Efficiency score of individual DMUs; θX_0 is radial contraction



of observed input; λX_s is optimised value of minimum input when the concerned DMU is not included in the set of DMUs; Y_0 is the observed level of output; and λY_s is optimised standard level of output.

5.3.6 Discrimination of Inefficient Units

Inefficient LICs with OTE score less than 1 can be discriminated among 4 distinct categories based on quartile cut-points of their OTE scores. They are: 'most inefficient' (OTE score below first quartile), 'below average' (OTE score between first and second quartile), 'above average' (OTE score between second and third quartile) and 'marginally inefficient' (OTE score more than third quartile but less than 1).

5.3.7 Statistical Package used for Analysis

DEA Solver, a MS Excel based analytical package has been used for calculation of OTE, PTE, and SE, RTS, Super-efficiency and frequency of efficient DMUs in the reference set of inefficient units. SPSS 20.0 has also been used to calculate quartile cut-points based on OTE scores of inefficient units to discriminate among them.

6. Results and Discussion

Measure of OTE, PTE, SE and RTS of all 24 companies for the year 2015-16 has been estimated following the methodology described in Section 5 and presented in Table-2.

Table-2: Efficiency Scores of DMUs for 2015-16

No.	DMUs	Overall Technical Efficiency (OTE) Score	Pure Technical Efficiency (PTE) Score	Scale Efficiency (SE) Score	Returns to Scale (RTS)
1	Aegon	0.510386	0.720077	0.708794	IRS
2	Aviva	1	1	1	CRS
3	Bajaj Allianz	1	1	1	CRS
4	Bharti AXA	0.293661	0.318046	0.923329	IRS
5	Birla Sunlife	0.710678	0.799147	0.889296	CRS
6	Canara HSBC	0.933756	1	0.933756	DRS
7	DHFL Pramerica	0.747857	0.92636	0.807307	IRS
8	Edelwiess Tokio	0.256718	0.828972	0.309682	IRS
9	Exide Life	0.347312	0.347828	0.998517	IRS
10	Future Generali	0.492728	0.591018	0.833694	IRS
11	HDFC Standard	0.8311	0.838652	0.990995	CRS
12	ICICI Prudential	1	1	1	CRS
13	IDBI Federal	0.50579	0.572962	0.882764	IRS



14	IndiaFirst	1	1	1	CRS
15	Kotak Mahindra	0.524838	0.606869	0.864829	IRS
16	LICI	1	1	1	CRS
17	Max Life	0.627842	0.642158	0.977706	IRS
18	PNB Metlife	0.376685	0.406838	0.925885	CRS
19	Reliance Nippon	0.580613	0.606553	0.957234	DRS
20	Sahara India	0.815626	1	0.815626	IRS
21	SBI Life	0.985352	0.987443	0.997882	CRS
22	Shriram	0.458951	1	0.458951	IRS
23	Star Union Dai- ichi	0.52048	0.870955	0.597597	IRS
24	TATA AIA	0.855793	0.892177	0.959219	CRS
	Average Score	0.68234	0.789836	0.868044	
<i>CRS: Constant Returns to Scale; IRS: Increasing Returns to Scale; DRS: Decreasing Returns to Scale</i>					

(Source: Compilation of Data obtained from IRDA Handbook on Indian Insurance Statistics 2015-16 using DEA Solver)

In the following sections, objective-wise inferences are drawn based on different results obtained in Table-2.

6.1 Addressing Objective 1: Efficiency of Indian Life Insurance Companies

In this section, efficiency of all 24 life insurance companies are measured with the help of OTE calculated as per input-oriented CCR model (Refer to Table-2). OTE scores of individual life insurers represent how well those companies have utilised their inputs, such as commission, operating expense and equity capital to generate a standard level of outputs, such as net premium, benefits paid and income from investment when the companies followed CRS. It is observed that there is a large asymmetry among the Indian life insurers as the OTE score ranges within

0.256 to 1. It means when CRS is assumed, efficiency of Indian life insurers ranges within 25.6% to 100%. Edelwiess Tokio (OTE: 0.2567) is the least efficient life insurer, while Aviva, Bajaj Allianz, ICICI Prudential, IndiaFirst, and LICI are fully efficient with the OTE score equal to 1. Hence, in the current dataset of 24 companies, all 5 companies with OTE score of 1 are ranked first. As the first position is occupied by 5 companies, the company with next highest OTE score is the 6th company in the group. Naturally, the following ranks (6 to 24) are of the inefficient companies as shown in Table-3.



Table-3: Efficient and Inefficient Life Insurance Companies

No.	Efficient Companies	OTE Score	Rank	No.	Inefficient Companies	OTE Score	Rank
1	IndiaFirst	1	1	1	SBI Life	0.985352	6
2	Bajaj Allianz	1	1	2	Canara HSBC	0.933756	7
3	LICI	1	1	3	TATA AIA	0.855793	8
4	ICICI Prudential	1	1	4	HDFC Standard	0.8311	9
5	Aviva	1	1	5	Sahara India	0.815626	10
				6	DHFL Pramerica	0.747857	11
				7	Birla Sunlife	0.710678	12
				8	Max Life	0.627842	13
				9	Reliance Nippon	0.580613	14
				10	Kotak Mahindra	0.524838	15
				11	Star Union Dai-ichi	0.52048	16
				12	Aegon	0.510386	17
				13	IDBI Federal	0.50579	18
				14	Future Generali	0.492728	19
				15	Shriram	0.458951	20
				16	PNB Metlife	0.376685	21
				17	Exide Life	0.347312	22
				18	Bharti AXA	0.293661	23
				19	Edelwiess Tokio	0.256718	24

(Source: Based on Table-2)

OTE, PTE and SE scores of individual 24 companies are sorted based on relative magnitude of their OTE scores in Table-4

Table-4: Representation of Efficiency of DMUs based on Descending Order of OTE Score

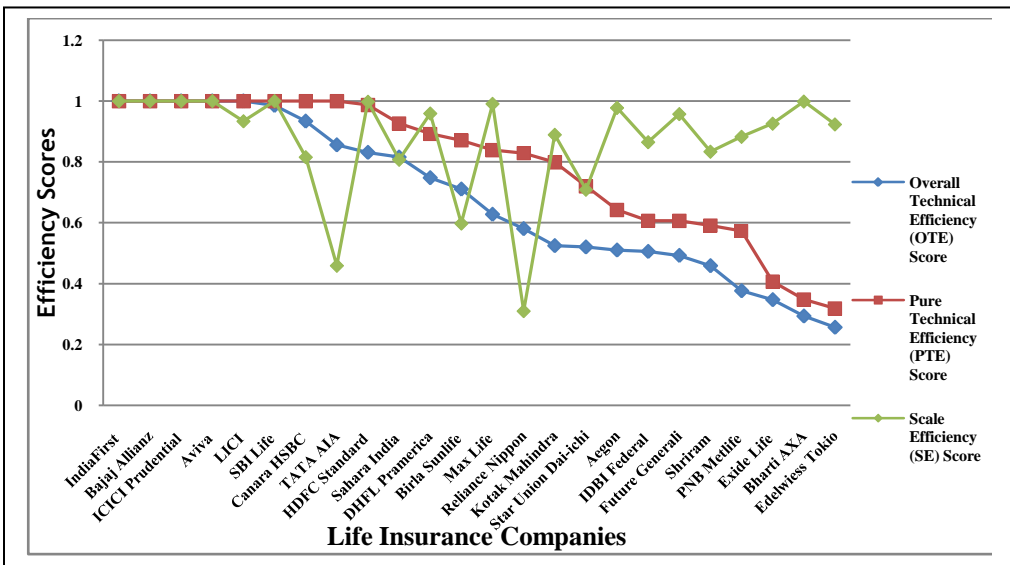
DMUs	Overall Technical Efficiency (OTE) Score	Pure Technical Efficiency (PTE) Score	Scale Efficiency (SE) Score	DMUs	Overall Technical Efficiency (OTE) Score	Pure Technical Efficiency (PTE) Score	Scale Efficiency (SE) Score
IndiaFirst	1	1	1	Max Life	0.627842	0.838652	0.990995
Bajaj Allianz	1	1	1	Reliance Nippon	0.580613	0.828972	0.309682
ICICI Prudential	1	1	1	Kotak Mahindra	0.524838	0.799147	0.889296
Aviva	1	1	1	Star Union Dai-ichi	0.52048	0.720077	0.708794



LICI	1	1	0.933756	Aegon	0.510386	0.642158	0.977706
SBI Life	0.985352	1	1	IDBI Federal	0.50579	0.606869	0.864829
Canara HSBC	0.933756	1	0.815626	Future Generali	0.492728	0.606553	0.957234
TATA AIA	0.855793	1	0.458951	Shriram	0.458951	0.591018	0.833694
HDFC Standard	0.8311	0.987443	0.997882	PNB Metlife	0.376685	0.572962	0.882764
Sahara India	0.815626	0.92636	0.807307	Exide Life	0.347312	0.406838	0.925885
DHFL Pramerica	0.747857	0.892177	0.959219	Bharti AXA	0.293661	0.347828	0.998517
Birla Sunlife	0.710678	0.870955	0.597597	Edelwiess Tokio	0.256718	0.318046	0.923329

(Source: Based on Table-2)

Chart-1: Efficiency Scores of DMUs in the Descending Order of OTE



(Source: Based on Table-4)

The average OTE for all 24 life insurers turns out to be 68.23% (Refer to Table-2). It indicates that when CRS is assumed, the life

insurance industry would need only 68.23% of the total input it is using right now to produce same level of output. It means that



by applying best practice technology, the life insurers can reduce their commission, operating expense and equity capital to the extent of 31.77% (1-0.6823) to produce the same level of output.

6.2 Addressing Objective 2: Causes of Financial Inefficiency of Indian Life Insurance Companies

It is evident that out of 24 companies, 19 companies have Operating Technical Inefficiency (OTIE) ($OTE < 1$) (Table-2&3). It is attributed to Pure Technical Inefficiency (PTIE) ($PTE < 1$) and Scale Inefficiency (SIE) ($SE < 1$). In the current dataset, out of 24 companies, 8 companies have $PTE = 1$ out of which 5 companies (namely, Aviva, Bajaj Allianz, ICICI Prudential, IndiaFirst, and LIC) also have $OTE = 1$. However, there are 3 other companies (namely, SBI Life, Canara HSBC and TATA AIA) which have only $PTE = 1$. Hence, PTIE of those companies are 0 and their OTIE is not due to managerial underperformance as stated earlier. However, there is no denying to the fact that because of inappropriate scale of operation which is captured with the help of SE, those 3 other companies have overall technical inefficiency. It is significant to note that rest of the companies' PTE [(24-8) 16 companies] are less than 1 and causes of financial inefficiencies of those companies perhaps are both managerial underperformance and inappropriate scale of operation.

Among the inefficient companies, PTE scores of Sahara India, Birla Sunlife, Reliance Nippon, Star-Union Dai-ichi are greater than SE (Chart-1). Hence, in those companies, scale inefficiency is more prevalent than managerial inefficiency. However, for rest of the 13 companies, inefficiency is caused

mainly because of managerial underperformance in utilising the available resources. The average PTE score for all 24 life insurer is 0.7898 (Refer to Table-2). Hence, out of overall inefficiency of 31.77% (Refer to Section 6.1), 21.02% (1-0.7898) is due to managerial failure and the rest is due to inappropriate scale of operation. Hence, a greater portion of overall inefficiency in the Indian life insurance sector is due to managerial inefficiency.

6.3 Addressing Objective 3: Change in Scale of Operation

Table-2 provides the RTS of individual DMUs. It is observed that all 5 efficient life insurers are following CRS. However, 5 inefficient companies, such as Birla SunLife, HDFC Standard, PNB Metlife, SBI Life, and TATA AIA are also operating at their optimum scale size. Among all other companies, Canara HSBC and Reliance Nippon are required to downsize their operation, while all other remaining companies are required to increase their scale of operation to improve their operating efficiency.

6.4 Addressing Objective 4: Ranking of Efficient Life Insurance Companies

6.4.1 Frequency of Efficient Units in Reference Set of Inefficient Units

Life insurers with OTE score 1 are considered to be efficient among all the life insurers included in the analysis, while other life insurers are comparatively incompetent. Of those 24 life insurers, 5 are efficient as they have OTE score of 1. Those 5 life insurers form the efficient frontier and are called reference set of the inefficient life insurers. They are utilising their resources in an efficient manner with zero wastage. Hence,



they are called peers. In this study, Aviva, Bajaj Allianz, ICICI Prudential, IndiaFirst, LIC are peers who set an example of operating efficiency to other inefficient life

insurers whose efficiency scores are below 1. On the basis of the frequency of the reference set (Table-4), efficient companies are ranked.

Table-5: Frequency of Efficient Life Insurers in the Reference Set of Inefficient Life Insurers

Inefficient Life Insurers	Efficient Life Insurers				
	Aviva	Bajaj Allianz	ICICI Prudential	IndiaFirst	LICI
Aegon				0.243312055	
Bharti AXA				0.614036863	
Birla Sunlife		6.27E-02	0.112788	1.888245	
Canara HSBC	6.70E-02	2.17E-03		1.203951	
DHFL Pramerica		3.93E-03		0.446642	
Edelwiess Tokio		1.72E-02		0.103311	
Exide Life				0.972381468	5.74E-04
Future Generali				0.326448918	
HDFC Standard			0.517043	1.466232	1.32E-02
IDBI Federal				0.365553541	1.96E-03
Kotak Mahindra		6.44E-02	0.15831	4.99E-02	1.63E-03
Max Life				0.217456094	3.27E-02
PNB Metlife		0.025099	1.67E-02	1.168916	
Reliance Nippon		0.490994	4.91E-02	0.880536	
Sahara India				0.158827168	1.62E-05
SBI Life			0.291226	0.90412	3.15E-02
Shriram		0.13516		9.59E-02	1.72E-04
Star Union Dai-ichi		1.08E-02	2.74E-02	0.142506	1.95E-03
TATA AIA				2.154770825	
Frequency Count	1	9	7	19	9

(Source: Compilation of Data obtained from IRDA Handbook on Indian Insurance Statistics 2015-16 using DEA Solver)

Table-6: Discrimination of Efficient Companies

Highly Robust Companies	Frequency Count	Marginally Robust Companies	Frequency Count
IndiaFirst	19	Bajaj Allianz	9
		LICI	9
		ICICI Prudential	7
		Aviva	1

(Source: Based on Table-5)



It is observed that IndiaFirst has highest frequency in the reference set of inefficient life insurers (Table-4&5). In fact, it is referenced against all the other inefficient companies. Hence, efficient practices of IndiaFirst are exemplary to its inefficient peers. On the other hand, Aviva is considered as efficient company based on OTE, while frequency count in the reference set of Aviva is observed as 1 as compared to other efficient companies whose frequency count is much better. Apparently, it may seem that the well-known names in life insurance business, such as Bajaj Allianz, ICICI Prudential and most significantly LIC would also have a higher efficiency. However, it is observed in reality that they are marginally efficient. IndiaFirst started

its operation only in 2010 (<https://www.indiafirstlife.com>) perhaps is the most efficient among all of them in the year 2015-16.

6.4.2 Estimation of Super-efficiency

In addition to calculation of frequency of efficient life insurers in the reference set of inefficient life insurers in Table-5, super-efficiency score is calculated as per input-oriented CCR model alternatively in order to draw more conclusive inference about relative performances of the life insurance companies. Their super-efficiency is calculated as per input-oriented CCR model as shown in Table-7.

Table-7: Super-efficiency Scores of DMUs

No.	DMUs	Super-efficiency Score	No.	DMUs	Super-efficiency Score
1	Aegon	0.510386	13	IDBI Federal	0.50579
2	Aviva	1.22907	14	IndiaFirst	1.64093
3	Bajaj Allianz	2.331614	15	Kotak Mahindra	0.524838
4	Bharti AXA	0.293661	16	LICI	316.3327
5	Birla Sunlife	0.710678	17	Max Life	0.627842
6	Canara HSBC	0.933756	18	PNB Metlife	0.376685
7	DHFL Pramerica	0.747857	19	Reliance Nippon	0.580613
8	Edelwiess Tokio	0.256718	20	Sahara India	0.815626
9	Exide Life	0.347312	21	SBI Life	0.985352
10	Future Generali	0.492728	22	Shriram	0.458951
11	HDFC Standard	0.8311	23	Star Union Dai-ichi	0.52048
12	ICICI Prudential	1.193827	24	TATA AIA	0.855793

(Source: Compilation of Data obtained from IRDA Handbook on Indian Insurance Statistics 2015-16 using DEA Solver)

Five companies like LIC, Bajaj Allianz, IndiaFirst, Aviva, ICICI Prudential having OTE=1, have registered a super-efficiency score of more than 1. Based on these scores, the first 5 life insurance companies may be ranked.



6.4.3 Rank of Efficient Life Insurance Companies based on Frequency in Reference Set and Super-efficiency Score

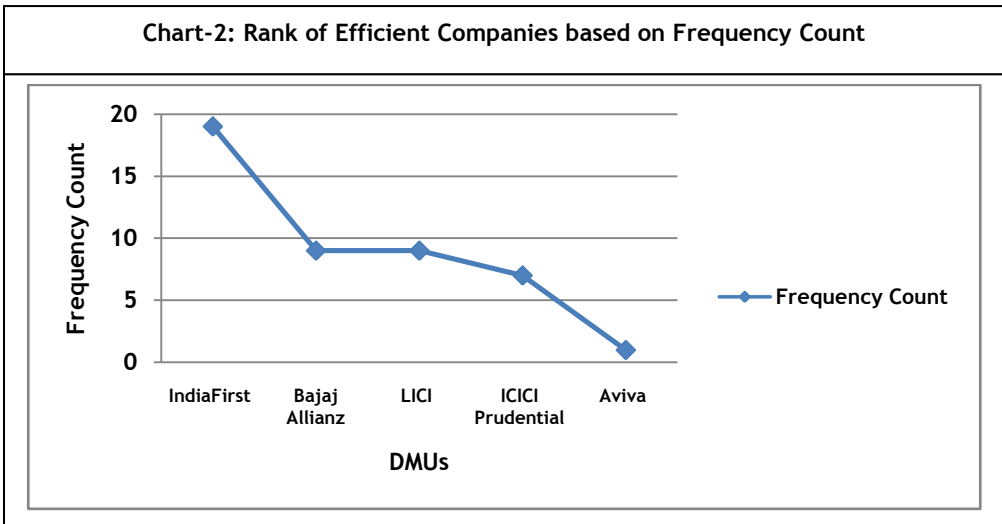
Ranks of efficient life insurers based on their frequency in the reference set of inefficient companies and super-efficiency score are depicted here.

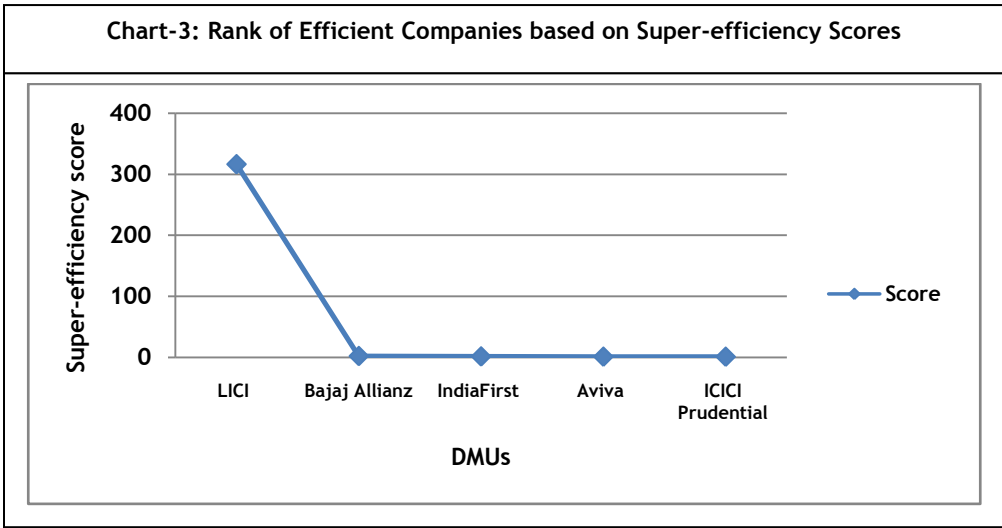
Table-8: Rank of Efficient Life Insurance Companies

Frequency in Reference Set (Refer to Table-5)			Super-efficiency Score (Refer to Table-7)		
DMUs	Frequency Count	Rank	DMUs	Score	Rank
IndiaFirst	19	1	LICI	316.3327	1
Bajaj Allianz	9	2	Bajaj Allianz	2.331614	2
LICI	9	2	IndiaFirst	1.64093	3
ICICI Prudential	7	4	Aviva	1.22907	4
Aviva	1	5	ICICI Prudential	1.193827	5

(Source: Table 5 & 7)

The observations of Table-8 are depicted in the following charts.





(Source: Table-8)

From the above charts, it is evident that there are only five efficient life insurance companies (*LICl, Bajaj Allianz, IndiaFirst, Aviva, ICICI Prudential*) as observed from both calculation of frequency of efficient life insurers in the reference set and super-efficiency score. As per frequency of efficient DMUs in the reference set of inefficient DMUs, IndiaFirst ranks first in terms of its efficiency in 2015-16. Bajaj Allianz and LICl both have a frequency count of 9. Hence, both of them are ranked second. As there are 2 members in second position, ICICI Prudential is ranked third. However, the result is different, if super-efficiency scores of the DMUs are considered. Truly speaking, LICl ranks first in terms of super-efficiency score, while LICl is clearly the market leader and an outlier in the current dataset. Their performance cannot be compared with other 4 private life insurers. Among the private players, Bajaj

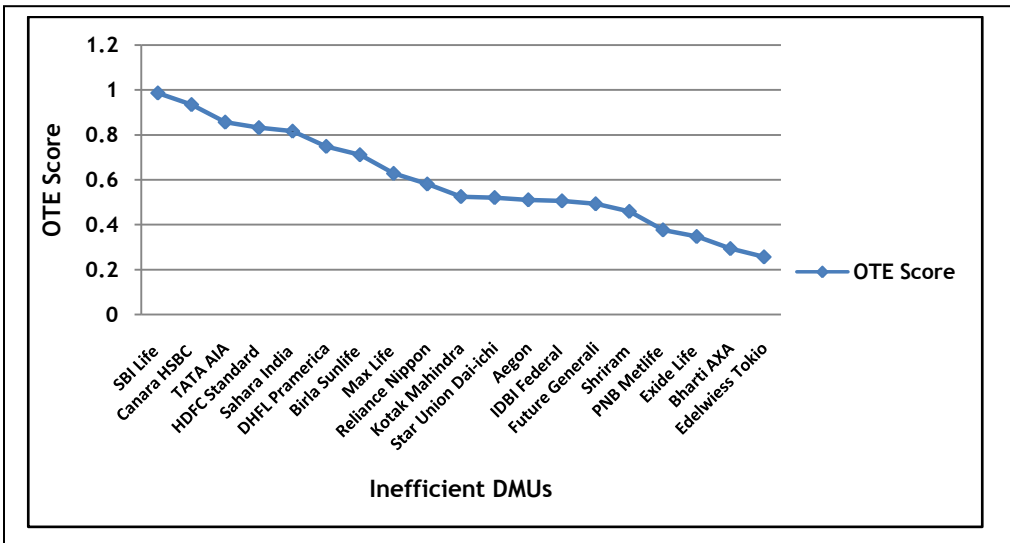
Allianz and IndiaFirst are frontrunners. Therefore, it may be stated that though LICl is the market leader in Indian life insurance sector, private players, such as Bajaj Allianz and IndiaFirst are fast catching up to LICl's growth and setting an example for other private sector life insurance companies.

6.5 Addressing Objective 5: Discrimination among Inefficient Life Insurance Companies

Out of 24 companies, 19 are inefficient with $OTE < 1$. Based on their OTE scores, inefficient companies have been ranked in Table-3. It is projected in chart - 4.



Chart - 4: OTE Scores of Inefficient Companies



(Source: Table-3)

Inferences

Inefficient DMUs (19) have been ranked as per their OTE scores (Refer to Chart-4). It is observed that SBI Life has highest OTE Score (0.9853), while Edelwiess Tokio (0.256) is the worst performer as per their OTE value. Those 19 companies are discriminated among 4 distinct groups based on their quartile cut-points of OTE scores. Among those 19 companies, OTE score varies from 0.256 (Edelwiess Tokio) to 0.9853 (SBI Life). The quartile cut-points estimated based on the individual OTE scores of those 19 companies are as follows.

Table-9: Quartile Cut-points of OTE Scores of Inefficient Life Insurance Companies

Statistics	OTE Scores of Inefficient Life Insurance Companies
Minimum	0.256
Quartile 1	0.458
Median (Quartile 2)	0.5248
Quartile 3	0.8156
Maximum (Quartile 4)	0.9853

(Source: Based on Table-2 using SPSS 20.0)

Companies that attain OTE score below first quartile (OTE<=0.458) are 'most inefficient'. Companies with OTE score less than median value but more than first quartile value



($0.458 < OTE \leq 0.5248$) are 'below average'. Companies with OTE score more than median value but less than third quartile ($0.5248 < OTE \leq 0.8156$) are included in the 'above average' category. The companies that have attained OTE score more than third quartile value but less than the maximum value ($0.8156 < OTE \leq 0.9853$) are 'marginally efficient' as depicted below.

Table-10: Discrimination of Inefficient LICs

Most Inefficient ($OTE \leq 0.458$)		Below Average ($0.458 < OTE \leq 0.5248$)		Above Average ($0.5248 < OTE \leq 0.8156$)		Marginally Inefficient ($OTE > 0.8156$)	
DMUs	OTE	DMUs	OTE	DMUs	OTE	DMUs	OTE
Bharti AXA	0.293	Aegon	0.5103	Birla Sunlife	0.7106	Canara HSBC	0.9337
Edelwiess Tokio	0.256	Future Generali	0.4927	DHFL Pramerica	0.7478	HDFC Standard	0.8311
Exide Life	0.347	IDBI Federal	0.5057	Max Life	0.6278	SBI Life	0.9853
PNB Metlife	0.376	Kotak Mahindra	0.5248	Reliance Nippon	0.5806	TATA AIA	0.8557
Shriram	0.458	Star Union Dai-ichi	0.5204	Sahara India	0.8156		
<i>First Quartile=0.458; Second Quartile=0.5248; Third Quartile=0.8156; Forth Quartile=0.9853</i>							

(Source: Compilation of Data obtained from IRDA Handbook on Indian Insurance Statistics 2015-16 using SPSS 20.0)

Canara HSBC, HDFC Standard, SBI Life, and TATA AIA are marginally inefficient companies. They may get their efficient status just by improving their resource utilisation strategy. On the other side, Bharti AXA, Edelwiess Tokio, Exide Life, PNB Metlife and Shriram are worst performers in the life insurance sector and in that case either they are supposed to take remedial measures for their improvements or alternatively they may go for scheme of merger for their survival in the market.

7. Conclusions

The current paper brings an insight into the efficiency of each of those life insurance companies and makes inferences on their individual performance. It has been

observed that 5 out of 24 companies, such as Aviva, Bajaj Alliance, IndiaFirst, ICICI Prudential and LIC are efficient. LIC as public insurance company has become the market leader in terms of select economic variables, while private companies, especially IndiaFirst and Bajaj Allianz are also not far behind in the race. In fact, their efficiency is exemplary to the other private players in the market. Among the inefficient life insurers, Canara HSBC, HDFC Standard, SBI Life, and TATA AIA are marginally inefficient and can achieve efficient status by slightly changing their operational strategy. However, Bharti AXA, Edelwiess Tokio, Exide Life, PNB Metlife and Shriram are worst performers with lowest efficiency scores and an inclusive internal remedial measure is required for their improvements.



Otherwise, there may be a possibility of amalgamation or consolidation of worst performer life insurance companies with efficient life insurance companies. One of the major causes behind inefficiency of insurance sector is perhaps managerial underperformance. However, working at an inappropriate scale level also contributes to their inefficiency. Based on a thorough investigation, Canara HSBC and Reliance Nippon perhaps are required to downsize their operation, while other inefficient banks should increase it to attain a higher level of efficiency.

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IMPLEMENTATION OF ACTIVITY BASED COSTING IN AN INFORMATION TECHNOLOGY COMPANY - A CASE STUDY

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R. Maheswaran*

Abstract:

In the recent years, Small and Medium businesses have been able to drive the economy and its contribution is indispensable in the South Asian countries. SME's are known as the main source of job creation particularly in the Indian context. They are under increasing pressure to remain competitive in today's current global economy (Owen P.Hall Jr and Charles J.McPeak, 2011). This paper intends to contribute to an increased awareness on the body of knowledge on activity based costing among the Indian Small and Medium sized Enterprises. The authors intend to discuss the conceptual model of ABC along with case study of a medium scale company in the Coimbatore region of Tamil Nadu State which is popularly called as Manchester of South India. The paper analyses both implementation practices of ABC along with its rationale and benefits that are experienced by the firm using case study method.

Key Words:

Activity Based Costing, Small and Medium Enterprises (SMEs), Rational, Benefits, Competitive



1.0 Introduction

Business Excellence is synonymous to continuous improvement in quality. Feasibility studies and research carried out in the past have shown that increased levels of quality along with reduced costs and prices of goods produced or sold, (Emami, 2007). SME's are under increasing pressure to remain competitive in today's current global economy (Owen P.Hall Jr and Charles J.McPeak, 2011). SME's face serious challenges in order to be competitive and they need to develop strategies enabling them to control their costs, (Martha et.al. 2014). Various authors in their research work evidenced the advantages of managing costs (Carmona, 1993; Shank & Govindarajan, 1995 etc.,).

Activity Based Costing (ABC) is a product costing technique, which attributes overhead costs to products on an activity basis. ABC focuses on activities as fundamental cost objects and uses the cost of these activities as building blocks for compiling the cost of other objects. ABC is an approach to the costing and monitoring of activities, which involves tracing resource consumption and costing final outputs. Resources are assigned to activities and activities to cost objects based on consumption estimates. The latter utilizes cost drivers to attach activity costs to outputs" (CIMA, UK)

Researchers today are still concerned whether companies are using the most adequate accounting methods, more specifically Activity Based Costing, (Kaplan, 2006; Banker et.al., 2008, Nassar et.al., 2011). Even without using any methods which are considered theoretically accurate we can still achieve correct management

decisions as long as the standing managers possess some knowledge of Activity Based Costing. This knowledge allows them to recognize that some of the information provided by methods which use information based on volume cost sharing may be warped, (Dearman Shield, 2001). Corporate Managers have been showing interest in this (ABC) philosophy and have sought to implement its methodology as an efficient help in increasing their competitiveness and developing strategies enabling them to control costs. (Martha, et.al, 2014).

1.1 Rationale of the Study

Given the prevalence of competitive rigor the study focuses on a firm engaged in Information Technology business which is also an emerging business among Medium scale enterprises. They are expected to offer its products to the end customers at a reasonable price. This could be possible only when the actual overhead costs are fairly distributed across products, particularly when common resources are expended in different ways. Maniriquez et.al (2014) examined the activity based pricing system as an important tool for SME's in Mexico as it facing serious challenges like competition and controlling of costs. This work aims to analyze and assess the impact, influence and benefits of the activity-based costing for the IT firm under study which confers a huge relevance to a study of this sort to draw inferences and conclusions.

1.2 Research Objectives

The objectives are

- i) To contribute to an increased awareness on the knowledge of activity based costing among the



Indian Small and Medium Sized Enterprises.

- ii) To illustrate the application of ABC in a medium scale IT company.

2.0 Activity Based Costing - Conceptual Insights

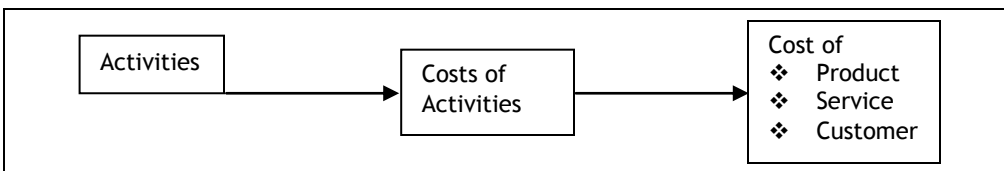
Activity Based Costing was first developed in the mid of 1980's. Two different organizations significantly contributed to the development of the ABC process through two of its researchers, Robert Kaplan and Robin Cooper as well as an R&D organization called Computer - Aided Manufacturing, International (Jones, Dugdale, 2002). It is a discipline that focuses on the management of activities as the route to improving the value received by the customer and the profit achieved by providing this value (Cost Accounting Management - International (CAM - I). Activity Based Costing refines the costing system by focusing on individual activities as the fundamental cost objects. ABC system calculates the cost of individual activities and assigns costs to cost objects such as products and services on the basis of the activities undertaken to produce each product or service. Activity Based Management as a discipline draws on activity based costing as its major source of information (Berliner and Brimson, 1988)

which includes cost drivers analysis, activity analysis and performance measurements, to improve the decision making processes. This involves continual search for opportunities to improve which in turn involves a careful and methodical study of activities (Kaplan, 1984)

Therefore, ABC is a technique that assigns costs to activities and services that are based on the amount consumed. It helps administrators manage costs, a tool for linking costs and results, action required for the production and delivery of specific results (Balalaie Somee Saraye et al., 2013).

2.1 Defining an Activity

An activity is a process or procedure that causes work. In relation to ABC, by activities we only mean the activities of the support or service departments, such as, material handling, machine set-up, engineering change, quality testing, inspection, etc. ABC differs from the traditional system only in respect of allocation of overhead or indirect costs. Direct costs are identified with, or assigned to, the cost object, in the same manner as done in case of traditional costing system. Overhead costs are linked to the cost objects based on activities. This is shown as below:



2.2 Activity Based Budgeting (ABB)

Activity-based budgeting is the process of planning and controlling the expected activities for the organisation to derive a

cost-effective budget that meets forecast workload and agreed strategic goals. An activity-based budget is a quantitative expression of the expected activities of the firm, reflecting management's forecast of

workload and financial and non-financial requirements to meet agreed strategic goals and planned changes to improve performance. (Brimson and John, 1994). ABB focuses on the activity/business processes. Resources required are determined on the expected activities and workload. The objective is to bring in efficiency into the system.

2.3 Activity Based Management (ABM)

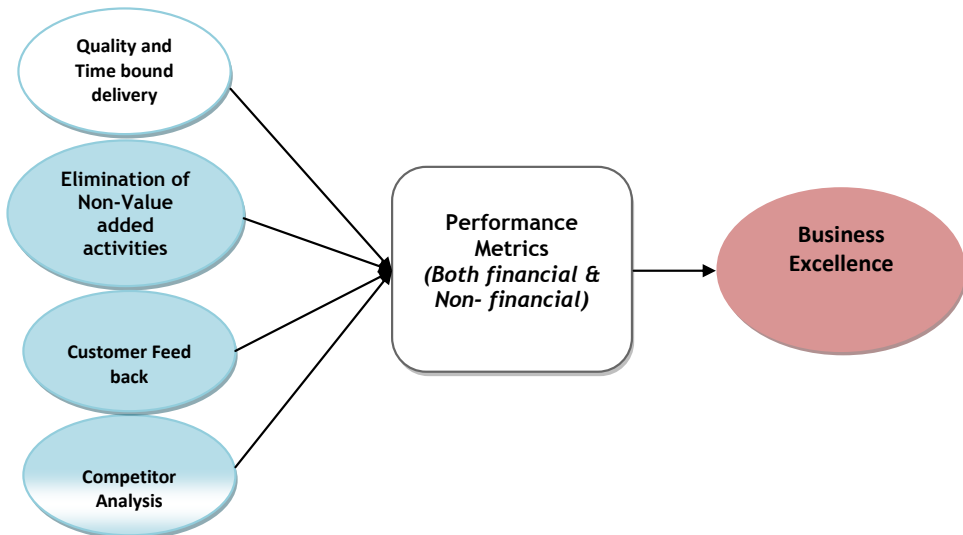
The analysis and cost of activities provide financial and non-financial information which is the basis for activity-based management. ABM makes this cost and operational information useful by providing

a value analysis, cost drivers and performance measures to initiate, drive or support improvement efforts and hence to improve the decision making process (Gunasekaran et.al, 2000). ABM is a discipline that focuses on the management of activities as the route to improving the value received by the customer and profit achieved by providing this value, (Cost Accounting Management - International (CAM -I). ABM draws on ABC as its major source of information (Berliner and Brimson, 1988).

3.0 Conceptual Model

A Conceptual model is evolved to highlight to optimize the full benefits of ABC/ABM.

Fig.1 Conceptual Model for ABC/ABM



For initiating ABC in a firm or in a department the first step is towards identification of value added and non - value added activities. The firms can use

management philosophy like Business Process Reengineering (BPR) or Just in time (JIT) for Inventories, to segregate the activities. Value added activity is one where



it adds value to the product or service being produced to the customers. Whereas, non - value added is often defined as 'an activity that can be eliminated with no deterioration of product attributes' (Miller, 1992). On identifying non - value added activities from the process, the employee who was erstwhile doing that activity should be engaged in an alternate work, caution to be taken that managing activity based costing should focus on the activities and not on the people who perform the activities (Gunasekaran, et.al. 2000). In this process, focus to be given to quality, lead time, flexibility cost and customer satisfaction. Then, each activity to be rated against best practices (Coburn et.al. 1995). Upon completion of such task, retain such activities that will add value to customers or that will help achieve business excellence and eliminate completely or in a phased manner the activities that do not contribute to improvements.

3.1 *Business Excellence through Performance Improvements*

Performance metrics are the fulcrum for the effective measurement of the success of the ABC system. One metric in isolation cannot help the firm rather managers may require multiple performance measures even from individuals (Innes et.al. 1994). The person who is responsible for accounting should include monetary and non - monetary metrics to measure the performance improvements. Accordingly cost drivers should be used as a basis of changing if required, (Gunasekaran, 2000). Selection of key performance indicators is a critical process and success depends on a sound analysis of the critical activities. The once selected measures should be reviewed

periodically as environment of business change (Greene and Flentov, 1991).

4.0 **Activity Based Costing in KG Information Systems (P) Ltd**

KG Information Systems Private Ltd (KGiSL) is a leading global provider of software and business support services and a part of the flagship KG Group of Companies for more than two decades with an annual turnover of Rs.240 Cr. The company comes under the Medium Scale category and helps clients do business better by leveraging industry-wide business experience. It is the Coimbatore's first global IT Company.

Global Software Services division develops and supports software requirements for Insurance, Banking, Financial Institutions, Capital Markets and service based industries. Their clientele ranges from fortune 500 companies to small and medium enterprises across the globe.

KGiSL also engaged itself in Business Support Services by providing complete business support services including customer relationship management, recruitment support services, back office & KPO solutions with a perfect combination of world class infrastructure and streamlined processes.

4.1 *Cost Management Practices at KGiSL*

Being a software company in the service industry KGiSL differs from manufacturing industries and characterizes the feature of Semi-Automatic production system. It does have a structured cost accounting system which enables them for proper compilation, allocation and determination of costs by following absorption costing under traditional costing systems. The company

currently practices cost sheet preparation, inventory costing, labour & overheads costing, cost reduction and control with budgeting and variance analysis. The company currently practices ABC in one of its processes with a sole object of Cost Control as their driving force.

4.2 Reasons for implementing ABC in KGiSL

The driving forces that favored the company to implement ABC is ascertained as high overhead costs, complex processes giving rise to more non-value added activities, inability of traditional costing methods in arriving at the correct product or service costs, to strengthen the MIS through ABC to support the product costing, to ultimately take competitive advantage by correcting the errors and failures in regular management of the firm. Initially ABC is practiced for minimum processes with an intention to extend its scope later to the whole of the firm. Cost pools were identified and cost drivers were defined and based on the value of the activity, the cost was determined. Further, the firm under study believes that ABC would help the firm in the long run leading to greater support of the system in strategic decisions which is highly integrated with budgeting and interfaced with technology. Thus, the catalyst for change from adopting thump rule on percentage basis under traditional approach the firm had moved to cost on the actual activities. Now, the company is able to arrive at the actual costs as

the segment with which it plays is highly competitive and in totality, the company's approach to activity based costing has been accepted to be a significant move.

4.3 Activity Analysis

ABC provides detailed information about the activities that are performed by the firms. On such diagnosis firms may improve their strategic decisions. Initially, the company separates the value added and non-value added activities by applying percentage of the selling prices method, by the way they were able to identify 8 value added activities out of which the most critical one is customized programmes and the cost of value added activities account for 70 percent. Similarly, the company were able to identify 7 non value added activities, which accounts for 30 percent, which had been discarded immediately. Therefore, firms by using different quality assurance methods like TQM, ISO9000, quality can be maintained during production and there is no need for any inspection (Gunasekaran et.al., 2000).

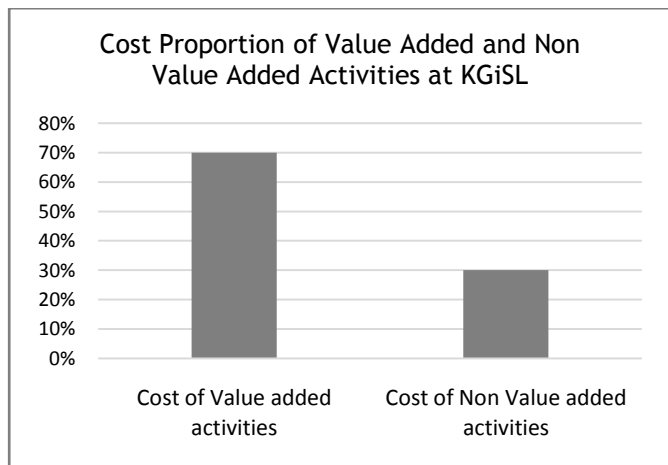


Fig. 2

Given the proliferation of IT Sector, its competitiveness cannot be underestimated these days, and SME's are no exception to that. The company benchmarks itself the performance indicators with their competitors and primarily concentrates on improving 'quality and time bound delivery'. They accomplish it through analysis of the processes meticulously, eliminate or merge the unwanted or small processes by doing functionality check to remove unnecessary activities. Customer feed-back is one of the most important performance metrics they use.

4.4 Actions Planned for next 12 months at KGiSL

To achieve its business objectives, the following were described and ranked in order of its priority by the firm as the actions planned for the next twelve months.

Table No.1 Actions Planned for the Next Twelve Months

S. No	Actions Planned	Ranking
1	Acquire Professional Software for ABC and Use	I
2	Train the Employees	II
3	Strengthen the Present Management Information System	III
4	Appoint Professional CMA's	IV
5	Increase the Economic Investment	V
6	Implement BPR	VI

4.5 Tipping points from the Experience of KGiSL

The firm under study also has a message to the industry which is summarized as follows, and some of these are felt to a greater extent with few others to some extent in their regular ABC environment of the firm.

- Lack of knowledge on Activity Based Costing by staff
- Complexity in identification of activities persists because data availability becomes cumbersome
- Very difficult to assign activity cost to products or services to a greater extent
- Difficulty in identifying cost driver
- Difficulties in embedding the IT and Cost systems
- High implementation costs

Further research can be undertaken to address the above pivotal areas which can additionally contribute to the existing body of knowledge on Activity based costing.

5.0 Summary & Conclusion

Though the concept of ABC is two decades old, Small and Medium Enterprises still lag behind in implementing ABC for improving its competitiveness. This article is a humble attempt to spread the knowledge of activity based costing in a place like Coimbatore which is considered to be the hub for SME's in South India. These SME's predominantly use traditional costing methods (Joseph & Samuel, 2017). The driving forces that favored KGiSL to implement ABC is ascertained to be high overhead costs, and complex processes giving rise to more non-value added activities, which otherwise would be an impediment to take on competitive advantage. Further, KGiSL also perceives that in the long run ABC will lend greater support in strategic decisions. With this hope, the company is determined to move forward in extending Activity Based Costing technique to other processes which is much appreciated.



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IMPACT OF DEMOGRAPHIC PROFILE ON INVESTOR BIASES IN INDIA USING OLAP AND ANOVA

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Abstract:

There are ample evidences of existence of investment biases among Indian investors. Banerjee, De, and Bandyopadhyay (2017), identified eight clusters of investor biases prevalent among Indian investors. The objective of this paper is to explore the impact of demographic profile on investor biases. In this paper, six demographic parameters, e.g. gender, education, occupation, investment, age, and income are being considered. The effect of these demographic parameters is explored on eight behavioural clusters. We used online analytical processing (OLAP) and ANOVA as statistical tools for analysing the data.

Key Words:

Demographic Profile, Investor Biases, Online Analytical Processing (OLAP), ANOVA



Introduction

Literature shows ample evidence of investor biases among Indian investors. Banerjee, De, and Bandyopadhyay (2017), identified eight clusters of investor biases prevalent among Indian investors. However, the objective of this paper is to explore if these eight biases are similarly impacted by demographic profile of investors. In this paper, we explored the impact of six demographic profile factors e.g. gender, age, education, occupation, income, and investment, on eight clusters of investment biases as described by Banerjee, De, and Bandyopadhyay (2017). We collected the relevant data through a survey questionnaire. The survey data was then checked for reliability. The descriptive statistics of the data is then analysed by using online analytical processing (OLAP). The statistical significance of the effect of demographic factors on investor biases are then tested using one-way ANOVA. The results are revealing. The study gives a unique insight into the behavioural pattern of individuals.

Behavioural Biases

Banerjee, De, and Bandyopadhyay (2017) classified the biases prevalent among Indian investors into eight clusters. The major classifications are given below:

Sl No.	CLUSTER
1	Sense of being in command and self-control: People feel that they may influence the outcomes.
2	Conservatism resulting into status quo: People do not want much change in current status, and is willing to maintain a status quo.
3	Cognitive Dissonance: People's decision making often gets influenced by pre-existing beliefs and emotions.
4	Overconfidence and Optimism: People are overconfident about expected outcomes. They are optimistic also.
5	Being in sense of Inertia: People possess a sense of inertia. They often want to lead life in a less volatile manner. May not like disruptions, and disturbances.
6	Mental Accounting: Mental accounting is a dominant bias among Indian individuals. They have a tendency to segregate their information into manageable mental accounts.
7	Recent Memories Bias: People give more importance to recent events, while making decisions.
8	Disposition Effect/ Loss Aversion Bias: People are not much willing to realize losses. They want to avoid losses more strongly than realizing gains.

In this paper, we wish to explore if the demographic profiles mentioned earlier are having any impact on these investor biases. The objective of this paper is to perform the

demographic profile analysis of the above mentioned biases.

Literature Review

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).

Literature shows ample evidence about existence of behavioral biases among investors and its impact on investment decisions (Hershleifer, 2015; Thaler, 1999). Rasheed, Rafique, Zahid, and Akhtar (2018) revealed that the heuristics under study significantly cause investors to deviate from rational decision making while the locus of control have no significant moderating effect.

New research also reveals, first, the degree of regret bias and the disposition effects are unrelated, probably because the professional training of investors and the

disposition effects are not significantly related. Second, if investors are affected by contradictions arising from their decisions, then the likelihood that they will sell a stock will decrease as the investor relationships in the community improve and the regret bias increases (Chi Ming Ho 2018)

However, there are very few studies, which explored the psyche of Indian investors. This motivated us to explore the psychology of Indian investors. In this paper, we tried to explore the impact of demographic profiles on Indian investors.

Pompian (2010), described twenty important psychological biases among investors.

Overconfidence bias is explained by Odean (1999), who demonstrated that investors with discount brokerage suffers from overconfidence bias. After analysing 78000 investor households in USA, Barber and Odean (2000) found that people indulge into excessive trading due to overconfidence, which ultimately lead to less return realization. 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. 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.

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 observe that forecasts of any given release were anchored towards the recent values of that release, thereby giving rise to predictable surprises. Jain, Jain, and Jain (2015), explored the existence of anchoring bias among Indian investors.

According to Pompian (2011), When newly acquired information conflicts with pre-existing understandings, 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. Festinger (1957), first identified the presence of cognitive dissonance among human psyche. Antoniou, Doukas, and Subramanyam (2012), considered whether sentiment affects the profitability of momentum strategies. They hypothesized, news that contradicts investors' sentiment causes cognitive dissonance, slowing the diffusion of such news. Thus, losers (winners) become underpriced under optimism (pessimism).

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. Kahneman, Slovic, and Tversky (1982), identified the existence of availability bias.

Dunn (1989) demonstrated that *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. Billett, and Qian, (2008), explored the history of mergers and acquisitions made by individual CEOs. Their study had three main findings, firstly, CEOs' first deals exhibit zero announcement effects while their subsequent deals exhibit negative announcement effects; secondly, while acquisition likelihood increases in the performance associated with previous acquisitions, previous positive performance does not curb the negative wealth effects associated with subsequent deals; and thirdly, CEOs' net purchase of stock is greater preceding subsequent deals than it is for first deals. They interpreted these results as consistent with self-attribution bias leading to overconfidence. They also found evidence that the market anticipates future deals based on the CEO's acquisition history and impounds such anticipation into stock prices. Mahina N, Muturi W, and Mamba F, (2018) tasted the existence of self attribution bias in Rwandan stock market. The results confirmed that there was a significant positive linear relationship between self-attribution bias and Investment in Rwanda stock market. The study recommends that investors should be keen to identify such bias to increase their rationality in stock trading.



Langer (1975) explored first the existence of Illusion of Control Bias. Fellner (2004) found substantial evidence of illusion of control bias among investors. Meissner, and Wulf (2017), investigated the role of cognitive diversity in strategic decision making. They applied a vignette-based experimental research design to examine the effect of cognitive diversity in teams on decision maker's illusion of control. The results of these experiments provide evidence for a positive influence of high cognitive diversity for debiasing judgment while similarly indicating no such effect for groups with low cognitive diversity. These findings suggest that group composition aspects can play an important role for improving judgment in decision making teams and open promising new avenues for studying debiasing in behavioural strategy research.

Conservatism is an important bias to explore. Loweis, Hall, and Cloete (2016) showed that conservatism, anchoring, and other heuristic driven biases impact the real estate investors.

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*. Dimmock, Roy Kouwenberg, Mitchell, and Peijnenburg (2016), tested the relation between ambiguity aversion and five household portfolio choice puzzles e.g. low allocations to equity, nonparticipation in equities, own-company stock ownership, home-bias, and portfolio under-diversification. Using a representative US household survey, they measured ambiguity preferences using custom-designed questions. They found, as theory predicts, ambiguity aversion is

negatively associated with stock market participation, the fraction of financial assets in stocks, and foreign stock ownership, but it is positively related to own-company stock ownership.

Endowment bias forces more value in situations of holding the property rights. Kahneman, Knetsch, and Thaler (1991) demonstrated evidence of endowment bias among participants of an experiment. These studies ultimately led to winning Nobel prizes for Kahneman (1992) and Thaler (2017).

Self-control bias is an important bias propagated by Thaler, and Shefrin (1988). Laibson, Repetto, and Tobacman (1998), showed that self-control bias plays a major role in retirement savings. Alexandrov (2015) examined strategic implications of competing for consumers with self-control problems. For investment goods, he found that the equilibrium sign-up (lump-sum) fees decrease when competition intensifies, similarly to prices in standard oligopoly models.

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).

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. In



simple words, people tend to keep aside a certain portion of their wealth that is meant for their more “important” needs. Mascarenas and Yan (2017) analyzed the relationship between investors mental accounting and investment portfolio design from psychological and financial perspectives. The results of their risk and return experiment demonstrated that, despite having the same investment portfolio and the same investment environment (bull market or bear market), and due to the fact that investors investment risk preferences changed, their expected return and investment decision-making could be different.

Confirmation bias refers to a type of discerning perception that emphasizes ideas that confirm our beliefs, while devaluing whatever contradicts our beliefs. Statman and Fisher (2000) demonstrated the existence of confirmation bias among investors. Zaleskiewicz, Gasiorowska, Stasiuk, Maksymink,a Tal (2016) demonstrated that financial consultants who advise action rather than maintenance of the *status quo* is more acceptable by the investors, but this effect is limited by confirmation bias: when the client’s *a priori* opinion is more noticeable, greater authority is ascribed to experts whose advice confirms it.

Hindsight bias gives a perception that events were predictable, after the happenings are over. Fischhoff (2003) identified presence of hindsight bias, but the findings also show that lack of awareness substantially reduces the hindsight bias. Coolin, Erdfelder, Bernstein, Thornton, and Thornton (2016) experimented the impact of hindsight bias among different age groups. Their observations support the role of inhibitory

control in older adults’ hindsight bias and suggest that even individuals with higher inhibition ability are susceptible to HB when processing resources are limited

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.

Recency bias is a cognitive predisposition that causes people to recall more notably and provide emphasis to recent events and interpretation than those that occurred in the near or distant past (Pompian, 2011).

Demographic Profile

This research work includes the assessment of following demographic profiles on behavioural biases:

- Gender
- Education
- Occupation
- Investment
- Age
- Income

Data on demographic profile

The questionnaire is the basis of collection of data. The structured questionnaire is being mailed to 298 prospective respondents. Out of which, we received responses from 208 respondents. After scrutinizing, we found 8 responses are incomplete in nature. Finally, responses collected from 200 (N) respondents. The respondents belong to all categories of demographic profiles. The questionnaire was tested through a pilot study and modified accordingly. The responses are recorded under a 5-point Likert scale. The statistical software SPSS version 16.0 is being used for performing the statistical analysis.

Gender

The gender is being classified under two categories:

- Male denoted as '0'
- Female denoted as '1'

Education

The education is also classified under two categories:

- Non-Professional as 0
- Professional as 1

Age

Age of respondents is being classified under three categories:

- Young as 1
- Middle Aged as 2
- Senior as 3

Income

Income is being classified under two categories:

- Low as 1
- High as 2

Occupation

Occupation is being classified under three categories

- Service as 1
- Business as 2
- Self-employed professional as 3

Investment

Investment made by respondents are classified under three categories:

- Low as 1
- Moderate as 2
- High as 3

Methodology and Data Analysis

The survey data has been collected through a questionnaire. Firstly, the reliability score of the data has been checked using Cronbach's Alpha. Upon establishing the reliability of data, the descriptive statistics has been computed and analysed using online analytical processing (OLAP). Further to that, the significance of effect of demographic variables on behavioural biases have been tested using t-test and one-way ANOVA.

Reliability test

The reliability of data has been tested by measuring Cronbach's Alpha. The result is shown in Table 1:

Table 1: Reliability Test

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.658	0.669	8

The Cronbach's Alpha is 0.66, which falls under an acceptable range.

Descriptive Statistics

The study explores the effect of demographic profiles (gender, education, age, income, occupation and investment) on the behavioural biases. The responses are recorded under a 5-point Likert scale. The mean response should be around 2.5. If the mean is higher than 2.5, it indicates respondents are more inclined towards the bias. Similarly, a high standard deviation indicates variability of responses. Coefficient of variation indicates dispersion around the mean.

Table 2: Demographic profile analysis of investor biases

Bias	N	Mean	Standard Deviation (SD)	Median	Coefficient of Variation
Sense of being in command and self-control	200	2.76	0.83269	2.75	0.301699
Conservatism resulting into status quo	200	3.205	0.97608	3	0.304549
Cognitive Dissonance	200	3.1475	0.87224	3	0.277122
Overconfidence and Optimism	200	3.175	0.89632	3	0.282306
Being in sense of Inertia	200	3.25	0.89527	3	0.275468
Mental Accounting	200	2.855	1.14916	3	0.402508
Recent Memories Bias	200	2.9575	0.9468	3	0.320135
Disposition Effect and Loss Aversion Bias	200	2.9525	1.01199	3	0.342757

Table 2 reveals that 'Being in sense of inertia' has the highest mean of 3.25, whereas 'Mental Accounting' has the highest SD of 1.14916. The median is 3.00 in all the cases except 'Sense of being in command and self-control'.

The lowest mean of 2.76, belongs to 'Sense of being in command and self-control', which also has the lowest SD of 0.83269.

Gender and Investor biases

Table 3 shows the gender-wise profile of biases. Among the female, the sense of inertia is the highest (3.3537). However, the volatility is maximum in the case of male on Mental Accounting (1.17923). The mean 'sense of command and self-control' is in the case of male. Females do more mental accounting compared to male (3.00 and 2.8176). Males also seem to be more overconfident than females. In most of the cases, the median lies on 3 and above, this implies existence of bias in both male and female respondents. Exceptionally, the median of female respondents in case of 'sense of being in command and self-control' is 2.50.

Table 3 Gender and Investor biases - An Analysis

Bias	Gender	N	Mean	SD	Percentage of Total Sum	Median	Coefficient of Variation
Sense of being in command and self-control	Female	41	2.78	0.81	20.70%	2.5	0.29
	Male	159	2.75	0.84	79.30%	3	0.30
	Total	200	2.76	0.83	100.00%	2.75	0.30
Conservatism resulting into status quo	Female	41	3.21	0.81	20.50%	3	0.25
	Male	159	3.20	1.02	79.50%	3.5	0.32
	Total	200	3.21	0.98	100.00%	3	0.30
Cognitive Dissonance	Female	41	3.24	0.88	21.10%	3	0.27
	Male	159	3.12	0.87	78.90%	3	0.28
	Total	200	3.15	0.87	100.00%	3	0.28
Overconfidence and Optimism	Female	41	2.93	0.93	18.90%	3	0.32
	Male	159	3.24	0.88	81.10%	3.5	0.27
	Total	200	3.18	0.90	100.00%	3	0.28
Being in sense of Inertia	Female	41	3.35	0.80	21.20%	3.5	0.24
	Male	159	3.22	0.92	78.80%	3	0.28
	Total	200	3.25	0.90	100.00%	3	0.28
Mental Accounting	Female	41	3.00	1.02	21.50%	3	0.34
	Male	159	2.82	1.18	78.50%	3	0.42
	Total	200	2.86	1.15	100.00%	3	0.40
Recent Memories Bias	Female	41	2.83	0.92	19.60%	3	0.32
	Male	159	2.99	0.95	80.40%	3	0.32
	Total	200	2.96	0.95	100.00%	3	0.32
Disposition Effect and Loss Aversion Bias	Female	41	3.00	1.02	20.80%	3	0.34
	Male	159	2.94	1.01	79.20%	3	0.34
	Total	200	2.95	1.01	100.00%	3	0.34



Education and investor biases

Table 4 explores the impact of education on biases. We classified the education into two parts, professional and non-professional. Non-Professionals suffer from high inertia (mean - 3.3571). Non-professionals also have higher conservatism compared to professional respondents. ‘Sense of being in command and self-control’ has the lowest mean among professionals, as well as standard deviation. Professionals also seem to be more overconfident than non-professionals.

Table 4 Education and Investor biases - An Analysis

Bias	Education	N	Mean	SD	Percentage of Total Sum	Median	Coefficient of Variation
Sense of being in command and self-control	Non-Professional	70	2.8071	0.85	35.60%	3	0.3
	Professional	130	2.735	0.83	64.40%	2.5	0.3
	Total	200	2.76	0.83	100.00%	2.75	0.3
Conservatism resulting into status quo	Non-Professional	70	3.2357	0.95	35.30%	3.5	0.29
	Professional	130	3.1885	0.99	64.70%	3	0.31
	Total	200	3.205	0.98	100.00%	3	0.3
Cognitive Dissonance	Non-Professional	70	3.15	0.9	35.00%	3	0.29
	Professional	130	3.1462	0.86	65.00%	3	0.27
	Total	200	3.1475	0.87	100.00%	3	0.28
Overconfidence and Optimism	Non-Professional	70	3.1643	0.88	34.90%	3	0.28
	Professional	130	3.1808	0.91	65.10%	3.25	0.28
	Total	200	3.175	0.9	100.00%	3	0.28
Being in sense of Inertia	Non-Professional	70	3.357	0.89	36.20%	3.25	0.26
	Professional	130	3.1923	0.9	63.80%	3	0.28
	Total	200	3.25	0.9	100.00%	3	0.28
Mental Accounting	Non-Professional	70	2.8	1.15	34.30%	3	0.41
	Professional	130	2.8846	1.15	65.70%	3	0.4
	Total	200	2.855	1.15	100.00%	3	0.4
Recent Memories Bias	Non-Professional	70	2.8714	0.99	34.00%	3	0.35
	Professional	130	3.0038	0.92	66.00%	3	0.31
	Total	200	2.9575	0.95	100.00%	3	0.32



Disposition Effect and Loss Aversion Bias	Non-Professional	70	2.9429	1.04	34.90%	3	0.35
	Professional	130	2.9577	1	65.10%	3	0.34
	Total	200	2.9525	1.01	100.00%	3	0.34

Age and investor biases

The relationship between age and investor biases is shown in Table 5. With increase in age, the sense of command and self-control seems to diminish (Mean - 2.2273). Middle-aged people seem to suffer most by inertia (Mean-3.3438). Middle aged people seem- to be more conservative than young people. Senior respondents also suffer from disposition and loss-aversion bias. Senior people also get affected by recent memories bias (mean-3.1818). They also do more mental accounting compared to young and middle-aged (Mean - 3.00). Young and middle-aged respondents are more overconfident and optimistic compared to senior respondents. Cognitive dissonance is more in the case of younger people. However, the opinion of senior varied most in the case of disposition effect. The median is 3.00 in most cases.

Table 5 Age and Investor biases - An Analysis

Bias	Age	N	Mean	SD	Percentage of Total Sum	Median	Coefficient of Variation
Sense of being in command and self-control	Young	157	2.8185	0.83	80.20%	3	0.29
	Middle aged	32	2.6563	0.73	15.40%	2.5	0.28
	Senior	11	2.227	0.98	4.40%	2	0.44
	Total	200	2.76	0.83	100.00%	2.75	0.3
Conservatism resulting into status quo	Young	157	3.1847	0.99	78.00%	3	0.31
	Middle aged	32	3.3125	0.81	16.50%	3.5	0.24
	Senior	11	3.1818	1.27	5.50%	3.5	0.4
	Total	200	3.205	0.98	100.00%	3	0.3
Cognitive Dissonance	Young	157	3.1624	0.84	78.90%	3	0.27
	Middle aged	32	3.0938	0.97	15.70%	3	0.31
	Senior	11	3.0909	1.04	5.40%	3	0.34
	Total	200	3.1475	0.87	100.00%	3	0.28
Overconfidence and Optimism	Young	157	3.1783	0.91	78.60%	3	0.29
	Middle aged	32	3.1875	0.84	16.10%	3.5	0.26
	Senior	11	3.0909	0.94	5.40%	3	0.31
	Total	200	3.175	0.9	100.00%	3	0.28
Being in sense of	Young	157	3.2389	0.85	78.20%	3	0.26



Bias	Age	N	Mean	SD	Percentage of Total Sum	Median	Coefficient of Variation
Inertia	Middle aged	32	3.344	1.04	16.50%	3.5	0.31
	Senior	11	3.1364	1.16	5.30%	3	0.37
	Total	200	3.25	0.9	100.00%	3	0.28
Mental Accounting	Young	157	2.8344	1.19	77.90%	3	0.42
	Middle aged	32	2.9062	1.03	16.30%	3	0.35
	Senior	11	3	1	5.80%	3	0.33
	Total	200	2.855	1.15	100.00%	3	0.4
Recent Memories Bias	Young	157	2.9554	0.93	78.40%	3	0.31
	Middle aged	32	2.8906	1.05	15.60%	3	0.36
	Senior	11	3.1818	0.93	5.90%	3	0.29
	Total	200	2.9575	0.95	100.00%	3	0.32
Disposition Effect and Loss Aversion Bias	Young	157	2.9427	0.99	78.20%	3	0.34
	Middle aged	32	2.9688	1.03	16.10%	3	0.35
	Senior	11	3.0455	1.29	5.70%	3	0.42
	Total	200	2.9525	1.01	100.00%	3	0.34

5.3.6 Income and Investor Biases

Table 6 explores the effect of income on investor biases. The income is being classified under two categories: low and high. People earning lower income are having a higher inertia. Low income people also suffer from higher conservatism, and recent memories bias. However, the cognitive dissonance is marginally higher in the case of high income people. Low income group has also shown higher disposition effect. Low income group has shown high volatility in the case of mental accounting (SD 1.155). The median is 3.00 in most of the cases.

Table 6 Income and Investor biases - An Analysis

Bias	Income	N	Mean	SD	Percentage of Total Sum	Median	Coefficient of Variation
Sense of being in command and self-control	Low	184	2.7772	0.84	92.60%	3	0.3
	High	16	2.563	0.7	7.40%	2.5	0.27
	Total	200	2.76	0.83	100.00%	2.75	0.3
Conservatism resulting into	Low	184	3.2174	0.99	92.40%	3.5	0.31
	High	16	3.0625	0.79	7.60%	3	0.26



Bias	Income	N	Mean	SD	Percentage of Total Sum	Median	Coefficient of Variation
status quo	Total	200	3.205	0.98	100.00%	3	0.3
Cognitive Dissonance	Low	184	3.1467	0.85	92.00%	3	0.27
	High	16	3.1562	1.14	8.00%	3.5	0.36
	Total	200	3.1475	0.87	100.00%	3	0.28
Overconfidence and Optimism	Low	184	3.1793	0.89	92.10%	3	0.28
	High	16	3.125	1.04	7.90%	3.5	0.33
	Total	200	3.175	0.9	100.00%	3	0.28
Being in sense of Inertia	Low	184	3.255	0.88	92.20%	3	0.27
	High	16	3.1875	1.09	7.80%	3.25	0.34
	Total	200	3.25	0.9	100.00%	3	0.28
Mental Accounting	Low	184	2.875	1.16	92.60%	3	0.4
	High	16	2.625	1.09	7.40%	3	0.41
	Total	200	2.855	1.15	100.00%	3	0.4
Recent Memories Bias	Low	184	2.9837	0.94	92.80%	3	0.32
	High	16	2.6562	1	7.20%	3	0.37
	Total	200	2.9575	0.95	100.00%	3	0.32
Disposition Effect and Loss Aversion Bias	Low	184	2.962	1.02	92.30%	3	0.35
	High	16	2.8438	0.91	7.70%	3	0.32
	Total	200	2.9525	1.01	100.00%	3	0.34

5.3.7 Occupation and Investor biases

Table 7 explored the impact of occupation on investor biases. Among the respondents, self-employed professionals are affected by inertia (Mean - 3.266). A business person gets affected more by recent memories bias compared to service holders and businessmen. Mental accounting among service holders is comparatively less than businessmen and self-employed professionals. The sense of command and self-control is virtually the same among different professions.

Table 7 Occupation and Investor biases - An Analysis

Bias	Occupation	N	Mean	SD	Percentage of Total Sum	Median	Coefficient of Variation
Sense of being in command and self-control	Service	76	2.7171	0.78	37.40%	2.5	0.29
	Business	30	2.7167	0.72	14.80%	3	0.26
	Self-Employed Professional	94	2.8085	0.91	47.80%	3	0.32



Bias	Occupation	N	Mean	SD	Percentage of Total Sum	Median	Coefficient of Variation
	Total	200	2.76	0.83	100.00%	2.75	0.3
Conservatism resulting into status quo	Service	76	3.1423	0.85	37.90%	3	0.27
	Business	30	3.2312	0.84	14.90%	2.5	0.26
	Self-Employed Professional	94	3.1425	0.85	47.20%	3	0.27
	Total	200	3.1557	0.85	100.00%	3	0.27
Cognitive Dissonance	Service	76	3.1513	0.9	38.00%	3	0.29
	Business	30	3	0.75	14.30%	3	0.25
	Self-Employed Professional	94	3.1915	0.89	47.70%	3	0.28
	Total	200	3.1475	0.87	100.00%	3	0.28
Overconfidence and Optimism	Service	76	3.1513	0.96	37.70%	3.5	0.3
	Business	30	3.2	1	15.10%	3	0.31
	Self-Employed Professional	94	3.1862	0.82	47.20%	3	0.26
	Total	200	3.175	0.9	100.00%	3	0.28
Being in sense of Inertia	Service	76	3.2368	0.89	37.80%	3.5	0.28
	Business	30	3.2333	1.1	14.90%	3.25	0.34
	Self-Employed Professional	94	3.266	0.84	47.20%	3	0.26
	Total	200	3.25	0.9	100.00%	3	0.28
Mental Accounting	Service	76	2.711	1.03	36.10%	3	0.38
	Business	30	3.0667	1.2	16.10%	3	0.39
	Self-Employed Professional	94	2.9043	1.22	47.80%	3	0.42
	Total	200	2.855	1.15	100.00%	3	0.4
Recent Memories Bias	Service	76	2.9211	0.9	37.50%	3	0.31
	Business	30	3.1667	1.01	16.10%	3	0.32
	Self-Employed Professional	94	2.9202	0.97	46.40%	3	0.33
	Total	200	2.9575	0.95	100.00%	3	0.32
Disposition Effect and Loss	Service	76	2.9013	0.98	37.30%	3	0.34
	Business	30	3.0167	1.21	15.30%	3	0.4



Bias	Occupation	N	Mean	SD	Percentage of Total Sum	Median	Coefficient of Variation
Aversion Bias	Self-Employed Professional	94	2.9734	0.98	47.30%	3	0.33
	Total	200	2.9525	1.01	100.00%	3	0.34

Investment and Investor Biases

Table 8 explores the relationship between investments and biases. The high income group are affected more by sense of inertia (Mean 3.625). The low investment group are more conservative compared to moderate and high income group. However, the disposition effect is higher among moderate investors.

Table 8 Investment and Investor biases - An Analysis

Bias	Investment	N	Mean	SD	Percentage of Total Sum	Median	Coefficient Of Variation
Sense of being in command and self-control	Low	134	2.7463	0.83	66.70%	2.5	0.3
	Moderate	58	2.8103	0.88	29.50%	3	0.31
	High	8	2.625	0.52	3.80%	2.5	0.2
	Total	200	2.76	0.83	100.00%	2.75	0.3
Conservatism resulting into status quo	Low	134	3.2612	0.98	68.20%	3	0.3
	Moderate	58	3.069	0.97	27.80%	3	0.31
	High	8	3.25	1	4.10%	3.75	0.31
	Total	200	3.205	0.98	100.00%	3	0.3
Cognitive Dissonance	Low	134	3.2164	0.85	68.50%	3	0.26
	Moderate	58	2.9655	0.95	27.30%	3	0.32
	High	8	3.3125	0.37	4.20%	3.25	0.11
	Total	200	3.1475	0.87	100.00%	3	0.28
Overconfidence and Optimism	Low	134	3.153	0.92	66.50%	3	0.29
	Moderate	58	3.181	0.85	29.10%	3.5	0.27
	High	8	3.5	0.85	4.40%	3.75	0.24
	Total	200	3.175	0.9	100.00%	3	0.28
Being in sense of Inertia	Low	134	3.2537	0.87	67.10%	3.25	0.27
	Moderate	58	3.1897	0.92	28.50%	3	0.29
	High	8	3.625	1.09	4.50%	4	0.3
	Total	200	3.25	0.9	100.00%	3	0.28
Mental Accounting	Low	134	2.8731	1.17	67.40%	3	0.41
	Moderate	58	2.8793	1.11	29.20%	3	0.39
	High	8	2.375	1.19	3.30%	3	0.5
	Total	200	2.855	1.15	100.00%	3	0.4



Bias	Investment	N	Mean	SD	Percentage of Total Sum	Median	Coefficient Of Variation
Recent Memories Bias	Low	134	2.9739	0.93	67.40%	3	0.31
	Moderate	58	2.8534	0.95	28.00%	3	0.33
	High	8	3.4375	1.12	4.60%	3.5	0.32
	Total	200	2.9575	0.95	100.00%	3	0.32
Disposition Effect and Loss Aversion Bias	Low	134	2.9403	1.01	66.70%	3	0.34
	Moderate	58	2.9483	1.01	29.00%	3	0.34
	High	8	3.1875	1.16	4.30%	3	0.36
	Total	200	2.9525	1.01	100.00%	3	0.34

Significance of Effect of Demographic Profile on Behavioural Biases

The results from descriptive statistics using OLAP shows impact of demographic variables e.g. gender, education, age, income, occupation, and investment on investor biases. To assess whether these differences are statistically significant. We applied t-test for understanding the impact of gender and education on investor biases. One-way ANOVA has been applied for understanding the effect of age, income, occupation, and investment on investor biases. The statistical significances of biases are shown in Table 9 below.

Gender and Biases - T test

Table 9 shows the results of t-test to assess the effect of gender on investor biases. We considered two categories of gender male and female. The eight clusters of biases as mentioned earlier are also considered.

The results show that in the case of *overconfidence bias* the gender statistically have significant effects. The independent sample t-test was conducted to compare the difference on biases due to gender. There is a significant difference (t: 2.003; p: 0.047) on *overconfidence bias* between male

(mean: 3.2390; SD: 0.88023) and female (mean: 2.9268; SD: 0.92575)

For other biases, gender does not demonstrate any statistically significant difference.

5.4.2 Education and Biases - T-test

T-test has been conducted to assess statistical significance of education on eight investor biases. The results of t-test have been presented in Table 9. The result shows no significant impact of education on investor biases.

Age and Biases - One-way ANOVA

One-way ANOVA has been conducted to assess statistical significance of age on eight investor biases. The results of ANOVA have been shown in Table 9. The result shows no significant impact of education on investor biases.

Income and Biases - One-way ANOVA

One-way ANOVA has been conducted to assess statistical significance of income on eight investor biases. The result of ANOVA is displayed under table 9. The result shows no



significant impact of income on investor biases.

Occupation and Biases - One-way ANOVA

One-way ANOVA has been conducted to assess statistical significance of occupation on eight investor biases. The results of ANOVA are displayed under table 9. The result shows no significant impact of occupation on investor biases.

Investment and Biases - One-way ANOVA

One-way ANOVA has been conducted to assess statistical significance of investment on eight investor biases. The results of ANOVA are displayed under table 9. The result shows no significant impact of investment on investor biases.

Table 9: Statistical significance of demographic profiles on investor biases

Biases and demographic profile	Gender t-test significance	Education t-test significance	Age - ANOVA	Income ANOVA	Occupation ANOVA	Investment ANOVA
Sense of being in command	0.86	0.56	0.055	0.324	0.742	0.797
Conservatism	0.99	0.75	0.795	0.544	0.329	0.454
Cognitive Dissonance	0.43	0.98	0.9	0.967	0.58	0.162
Overconfidence	0.047*	0.9	0.949	0.817	0.956	0.569
Sense of Inertia	0.41	0.22	0.76	0.772	0.972	0.436
Mental Accounting	0.37	0.62	0.867	0.405	0.304	0.485
Recent memories	0.33	0.35	0.68	0.185	0.425	0.248
Disposition effect	0.74	0.92	0.944	0.655	0.839	0.799

**significant at 95% level.*

Concluding Observations

This study explored the impact of demographic variables on prominent investor biases. The study was conducted among Indian investors. Though the descriptive statistics did find different impacts of demographic variables on investor biases, in most of the cases, except age, we did not find it statistically significant at 5%. This indicates that the biases among investors

may get affected by age. However, the other demographic factors e.g. gender, education, income, occupation and investment may not affect the investor biases. However, one of the limitation of this study is the sample size is limited to 200 (N). The similar earlier studies from literature also demonstrated mixed results. In that sense, our study is in line with existing literature.



However, even a non-significant impact may also be important, as far as the final portfolio choice is concerned (Kandel and Stambaugh 1996; Neil and Whiteley 1998). This area requires further exploration, may be with higher sample size. Our study is also limited to Delhi NCR region in India. Similar explorations may be made in other geographical regions of India, encompassing different communities. This study may also be extended by incorporating other demographic profiles e.g. marital status, race etc.

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PATTERN OF GROWTH AND INSTABILITY IN CROP PRODUCTION IN BURDWAN DURING 2000 TO 2013: A COMPARATIVE STUDY

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Abstract:

The study has estimated the growth and instability in production of vegetables vis-a-vis traditional crops in Burdwan as well as West Bengal. The study is based on the secondary data collected from different government sources from 2000-01 to 2012-13. The growth rates on area, production and productivity are measured by fitting exponential trend equation and instability is measured by using Cuddy-Della Valle index. The growth rates of traditional crops namely, rice (aus, aman, boro), wheat, potato and mustard are found to be either negative or insignificant during the study period in Burdwan, while the production growth rates of most of vegetables namely, tomato, cabbage, cauliflower, brinjal, onion, ladyfinger, cucurbits and radish are significantly positive in the district. Insignificant or negative growth in production of each of traditional crops arises due to either stagnation in productivity growth or shrinkage in area growth or both. On the other hand, significant positive growths in productions of vegetables occurred mainly due to positive growths in their areas. The production variabilities of all types of vegetable (except radish and other vegetables) are found to be very low compared to those of traditional crops. The agricultural scenario in West Bengal in respect of crop-wise growth and instability is more-or-less similar to that of its district, Burdwan.

Key Words:

Growth, Instability, Traditional Crops, Horticultural Crops, Cuddy-Della Valle Index



Introduction

The economic condition of Burdwan district mainly depends on agriculture and its allied activities. 58 percent of people of the district are engaged in this sector. Total agricultural land is 698.76 thousand hectares and net cropped area is 452.88 thousand hectares in this district (Source: This data are collected from Directorate of Agriculture, Govt. of W.B.). Many traditional crops like, Rice, Wheat, Potato, Mustard etc. are grown here. Rice is the main crop of the district. Burdwan is called the bowl of rice in West Bengal. Recently many types of vegetable are also grown in the district. After the Green Revolution and during the Left Front Government regime we got a breakthrough in the agriculture condition of the district (Saha and Swaminathan, 1994, Boyce, 1987). But in recent years agricultural condition in the district is not very encouraging because a number of farmers' suicide has taken place here currently due to probably their huge unpaid debt burden as alleged by the opposition parties. Also because of enormous rise in prices of agricultural inputs coupled with more or less constancy of prices of agriculture outputs, production of traditional crops is no longer a very profitable business. Further the land man ratio is decreasing in the district day-by day because the cultivated land is limited but population is increasing over time. In 1991 the land man ratio was 0.07 hectare and it declined to 0.05 hectare in 2011 in the district.

As the land man ratio is very low, there is less possibility of extensive farming in the district for improving agricultural condition. Further from the earlier studies of Saha and Swaminathan (1994) and Boyce (1987) we see that there was enormous growth in the

production of traditional crops in 1980s and 1990s in the district. Presently for these crops, probably deceleration hypothesis has been set in. For the betterment of agricultural condition, one should give emphasis here on intensive farming using large amount of capital, adequate amount of water resource, higher amount of labour, machineries, fertilizers and pesticides on a small plot of agricultural land. But all regions do not fulfill the criteria required for intensive farming because of lack of irrigation facility, the problem in availability of semi skilled labour and adequate funds in time etc. Vegetables are the important agricultural products which can be cultivated by using intensive agricultural technique. The vegetables are cultivated four or five times in a year when traditional crops can be grown one or two times in a year. The yield rate of vegetables is also very high, which supports for betterment of economic condition of the farmers and reduction of unemployment in rural economy. Further vegetables play an important role to protect the human body from several diseases. Many types of vitamin namely, vitamin - A, vitamin - B, vitamin - C, protein and carbohydrate come from vegetable crops which protect the healthy body. Presently, in the district many vegetables like, tomato, cabbage, cauliflower, ladyfinger, brinjal, radish etc are grown by the farmers. Generally there is a steady market for vegetables which are transacted at a steady remunerative price.

In the present study we have made an attempt to measure crop-wise growth and instability in Burdwan vis-a-vis West Bengal and also to find out whether the said growth or instability is caused by change in area or change in productivity. Further, we have examined in this respect the present



position of vegetables vis-à-vis other main crops in the district. This analysis helps know whether the farmers of the district are price responsive and whether the agricultural situation in the district is becoming stable. The study also covers the issue of knowing relationship between growth and instability, whether they are positively related or not taking all the major crops including vegetables of the district as well as the state into account.

Literature Survey

In the field of agricultural growth and instability we get a number of studies, some of which are surveyed here. In an important study Saha and Swaminathan (1994) analyzed the changes in the production of major crops in West Bengal in 1980s. Here the growth rate was measured by using two functional forms: one was exponential form and other was log- quadratic form. The growth performance of agricultural production was low in West Bengal and lower than that in India during 1965 to 1980. But in 1980s the growth in agricultural production of West Bengal was found to be highest in the country. The rice is major crop in West Bengal. The growth rates of cultivated area and yield of both aman and boro crops increased significantly during 1980s. The growth rates of production, area and yield also increased for two other crops, namely potato and oilseed in the state in 1980s. But wheat production was observed to be stagnant and its yield actually went down in West Bengal.

Choudhary et. al. (2011) examined the growth rates on area, production and productivity of mustard in India. Here also the growth rate was measured by fitting exponential trend equation. The growth

rates in production of mustard crop in Rajasthan and Uttarpradesh were higher than that in India during the study period. The growth rate of productivity was lower in Uttarpradesh than that in India as well as in Rajasthan, but in case of area the growth rates were higher in both the states than that in India.

Wasim (2011) in a paper analyzed the growth and instability in production of major fruits in Baluchistan during the period 1989 to 2009. Here also the growth rate was measured by estimating log-linear trend equation and instability was measured by the Cuddy- Della valle index. The study period was here divided into two sub-periods namely, period-I (1989-90 to 1998-99) and period-II (1999-00 to 2008-09). The positive growth rates in productions of all fruits were observed in the first sub-period. The growth in production took place due to growths in both area and productivity for some fruits namely, apple, dates, pomegranate, apricot, almonds etc., while the production growth rates of some other fruits namely, grapes, peach, plums occurred due to positive growth in area only. The production growth rates of all fruits in the second sub-period were less than those observed in the first sub-period. The productivity growth rate was observed to be significantly negative for each of fruits (except plumps) in the second sub-period due to drought, low output price, poor transportation system etc. But the production instability (with declining growth) in each of the fruits, like apple, dates, apricot, grapes, and plumps declined in the second sub-period.

Dharke and Acharya (2013) estimated growth and instability of vegetables in West Bengal and India. Here the growth rate was measured by using exponential trend



equation and instability was measured by coefficient of variance. The decomposition technique was used for measuring the percentage contribution of area, productivity and their interaction on the growth in production of vegetables. The study established that the growth rates of area, production and productivity increased highly for onion. The production growth rates of cabbage and cauliflower were lowest compared to the other vegetables. Further, the growth rates of productivity were found to be negative for the vegetables. The area contribution was higher than the contribution of productivity and interaction effect in most of the vegetables in West Bengal. More over the farming of vegetables was found to be less risky in West Bengal because the variabilities in area, production and productivity were found to be positive but insignificant for all the vegetables.

Paltasing and Goyari (2013) studied the agricultural growth and instability of area, yield and production in orrisa. In this study growth rate was measured by using the Kinked exponential growth model and instability was measured by using the same method of Boyce (i.e. the method adopted in the study of Boyce). The study period was here divided into two phases like, Pre-liberalization phase and Post-liberalization phase. The growth rate was found to be declined in the pre-liberalization period for some crops like, wheat, ragi, and millet. The growth rates for some other crops like, jowar, bajra and gram were slowed down in post-liberalization period. But growth rates of only two crops, namely, rice and mize were found to be positive in both the periods. The production instability for most of the crops increased in post- reforms period compared to pre- reforms period.

Sihmar's paper (2014) also discussed growth and instability in agricultural production of 12 major districts in Haryana during 1980-81 to 2006-07. Here the instability was measured by using Cuddy-Della Valle Index (CDI). The growth rate was measured here by using the same exponential (or log-linear) trend method as was used by many such previous studies in this area, like the studies of Rao (1975), Dharm Narain (1976), Mehra (1981), Hazell (1982), Rao et al (1988), B.P Vani and Vinod Vasul () etc. In this study it is found that the production of all the crops taken together increased during 1980s, but for a few others crops namely, mize, barley and massar it did not increase during the study period. But after nineteen eighties, many crops like, jowar, maize, gram, moong, massar and oilseeds registered negative growth in production. Here the productions of only foodgrains and cotton were found to increase continuously. The instabilities in rice, wheat and sugarcane productions were low in all the districts over the study period but for some other crops like, gram, mong and massar instability was observed to be high during that period.

Sing, Dikshit, Reddy, and Kuthe (2014) studied the growth and instability of rice production in Gujarat during 1982-83 to 2011-12. Here the compound growth rate was measured by using exponential function and instability was measured by using descriptive statistic, coefficient of variation. The area of rice production increased slightly in the state during the study period. The growth rates of production and productivity of rice were found to be positive in the selected districts of Gujarat. The instability in production as well as in yield was found to be high in most cases. Actually, coefficient of variation for rice production varied from 28 percent to 70



percent for the selected district of the state during study period.

From all these studies we get the motivation of conducting a fresh research on comparative analysis of agricultural growth and instability in traditional as well as non-traditional agricultural products in West Bengal and its major constituent district, Burdwan over the current period.

Data base and Methodology

We have taken the time series secondary data for our study. The data on area, production and productivity for major crops namely, rice (Aus, Aman, and Boro), wheat, potato, mustard and vegetables are collected from different issues of Statistical Handbook of Statistical Bureau of West Bengal. The data on index forms for area, production and productivity for foodgrains, non- foodgrains and all crops combined are collected from different issues of Statistical Abstract of West Bengal, BAES.

The period of our study is from 2000-01 to 2012-13 which covers the mainly matured period (having second generation of economic reforms) of liberalized economy. We have taken two villages namely, Bamnia and Aushgram for our in depth case study. Bamnia is selected as highly vegetables productive village and traditional crops are mainly grown in Aushgram village. We have taken 10 farmers from each village. The primary data on value of production, cost of production and resultant profitability are collected through a structured questionnaire using purposive but stratified sampling method in the current year 2016.

The compound growth rates of area, production and productivity are measured

simply by estimating exponential trend equation.

$$Y_t = AB^t U_t \dots\dots\dots (1)$$

Exponential trend equation has been selected out of different alternatives (namely, linear, quadratic, s-type growth curve, log quadratic etc.) on the assumption of constancy of growth rates which is not very restrictive for a short period of the time (13 years). With natural logarithmic transformation this equation turns into its linear form as follows: $\ln Y_t = \ln A + (\ln B)t + \ln U_t$

$$\text{i.e., } y_t = a + bt + u_t \dots\dots\dots (2)$$

where small letters are used to represent their respective log transformations. Here compound growth rate is measured by $100 \times b$.

The significance of growth rate is checked using student's t statistics with n-2 degrees of freedom. Also while fitting log-linear trend, we have checked the autocorrelation problem using DW statistics and in its presence we have used Cochrane-Orkut two steps procedure for correcting it using either first order or second order autoregressive scheme.

The instability of production is measured by using Cuddy - Della Valle index

$$C.D.I = C.V \sqrt{1 - R^2}$$

Where, C.V = coefficient of variation and R^2 is the coefficient of determination.



Results and discussion

Growth

From Table -1, we see that growth rate in overall agricultural production in West Bengal is significantly positive but with a low value of 1.5 percent per annum, which is

again contributed mainly by productivity growth. In Burdwan, however, we get insignificant growth in the production of all crops combined and this insignificant growth occurs due to declining growth in its cultivated area accompanied by low growth in its productivity.

Table-1: Estimated Crop-wise Growth Rates during 2000-2013

	Crop name	Burdwan			West Bengal		
		Area	Production	Productivity	Area	Production	Productivity
Traditional crops	Aus	-7.3* (-6.408) [1.613]	-5.3** (-3.026) [1.228]	0.6 (1.766) [1.927]	-6.3* (-17.492) [1.468]	-5.1* (-8.803) [1.334]	1.2* (3.366) [1.575]
	Aman	0.4 (0.814) [1.808]	1.8 (1.553) [1.254]	0.2 (0.574) [1.822]	-0.3 (-0.775) [2.083]	0.9 (1.349) [1.726]	1.3* (3.900) [1.566]
	Boro	-2.2* (-3.441) [1.402]	-2.2** (-2.419) [1.725]	-0.5 (-0.666) [1.986]	-1.2* (-3.304) [1.537]	-0.4 (-0.791) [1.372]	0.4 (1.494) [2.089]
	Wheat	-11.6* (-5.092) [1.683]	-10.9* (-4.166) [1.587]	0.8 (1.237) [1.843]	-3.1* (-10.889) [1.335]	-0.3 (-0.611) [1.995]	2.8* (7.112) [1.649]
	Potato	2.3* (3.157) [1.889]	3.0 (1.031) [2.245]	0.7 (0.223) [2.059]	2.5* (4.792) [1.354]	5.1** (2.995) [1.396]	2.6 (1.360) [1.434]
	Mustard	-8.5* (-9.665) [1.822]	-7.2* (-5.429) [1.375]	1.2 (1.000) [2.232]	-0.3 (-1.088) [1.506]	1.5*** (1.982) [2.145]	1.9** (2.526) [2.194]
Vegetables	Tomato	1.7* (6.287) [2.138]	4.4* (6.287) [2.138]	2.8* (4.208) [2.009]	2.2* (15.753) [2.215]	6.0* (14.249) [1.819]	3.8* (12.780) [1.623]
	Cabbage	0.9* (9.487) [2.206]	1.0* (10.302) [1.834]	0.1* (2.206) [2.712]	1.2* (9.192) [2.265]	1.3* (7.025) [1.835]	0.3 (1.734) [2.391]
	Cauliflower	1.4* (7.554) [1.960]	0.5*** (1.902) [2.157]	-0.9* (-6.683) [2.036]	1.8* (10.525) [1.278]	0.9* (5.240) [2.111]	-0.7* (-4.242) [2.047]
	Brinjal	1.2*** (1.997) [1.133]	2.2* (4.080) [1.138]	1.0* (3.788) [1.337]	1.1* (11.684) [2.291]	1.5* (10.549) [1.982]	0.6* (3.352) [1.906]
	Onion	2.6* (5.364) [2.069]	11.0* (12.234) [1.359]	8.4* (7.713) [1.801]	4.0* (24.553) [2.013]	6.9* (20.371) [1.766]	2.9* (10.346) [1.457]
	Cucurbits	1.8** (1.8**)	4.8* (4.8*)	2.4** (2.4**)	0.9* (0.9*)	3.5* (3.5*)	2.4* (2.4*)



		(2.236) [2.317]	(8.628) [1.835]	(2.314) [1.585]	(11.883) [2.326]	(12.482) [1.138]	(9.175) [1.514]
	Ladyfinger	4.6* (7.681) [2.034]	5.9* (8.662) [1.485]	1.2* (8.244) [1.659]	2.2* (20.418) [2.274]	3.0* (17.003) [1.590]	0.9* (9.925) [1.792]
	Radish	1.6 (0.405) [2.150]	4.0 (1.503) [2.090]	2.5*** (1.908) [2.133]	2.1* (12.568) [1.878]	4.2* (18.059) [1.901]	2.1* (10.889) [1.404]
	Other Vegetables	2.8*** (2.079) [2.480]	7.8* (3.503) [1.878]	5.0* (4.159) [1.736]	0.5** (2.316) [1.332]	6.0* (11.044) [1.226]	5.5* (11.397) [1.408]
	Total Combined Vegetables	2.4* (3.938) [1.465]	3.7* (6.990) [1.404]	1.2* (4.459) [1.601]	1.2* (18.685) [2.287]	2.8* (26.639) [1.394]	1.6* (16.741) [1.413]
Crop Groups	All Crops Combined	-0.6 (1.578) [1.544]	1.0 (1.749) [1.568]	1.6* (3.894) [1.567]	-0.5*** (-1.915) [1.887]	1.5* (4.918) [2.081]	2.0* (6.965) [1.558]

Notes: * Significant at 1% level, ** Significant at 5% level, *** Significant at 10% level. t- Values are within parentheses and D.W values are within square bracket.

We get clear picture by extending this analysis crop wise. Growth rates of area, production and productivity of different traditional crops in Table-1 are found to have either negative or insignificant in Burdwan. Wheat is having the highest negative production growth of -10.9 percent per annum, followed by mustard (-7.2 percent), aus (-5.3 percent) and boro (-2.2 percent). From Table-1 it is further observed that these insignificant or negative growth rates in production of traditional crops arise mainly due to shrinking of acreage, where as their productivities are insignificant. In case of West Bengal also the production growth rates are found to be either negative or insignificant for most of the traditional crops except potato and mustard. The production growth rates of potato and mustered are 5.1

percent and 1.5 percent respectively. The production growth rate of potato took place mainly due to its area growth but that in case of mustard occurred due to growth in its productivity. Declining growth in area played major role for most of the traditional crops resulting to crop-wise negative or insignificant production growth in West Bengal.

The production growth rates of all types vegetable except radish are found to have significantly positive in Burdwan. The growth rate of onion is the highest with value 11 percent per annum, followed by the group of other vegetables (7.8 percent), ladyfinger (5.9 percent), cucurbits (4.8 percent), tomato (4.4 percent), brinjal (2.2 percent), cabbage (1.0 percent) and cauliflower (0.5 percent) during the study period, which resulted to significant positive growth (3.7 percent) in production of all vegetables combined. The production growth rates occurred due to both area growth and



productivity growth for all types of vegetable (except cauliflower) in the district. Cauliflower registered positive growth in production only due to positive growth in its area.

In West Bengal also the growth rates in production for all types of vegetable are found to be significantly positive. Here also the production growth rate of onion is highest with value 6.9 percent, followed by tomato with 6.0 percent, group of other vegetables with 6.0 percent, cucurbits with 3.5 percent, brinjal with 1.5 percent, cabbage with 1.3 percent and cauliflower with 0.9 percent during the study period in West Bengal. All these led to significantly positive growth (2.8 percent) in production of all vegetables combined in the state. The growth rates of production for onion, tomato, brinjal, cucurbits, ladyfinger, radish, other vegetables and all vegetables combined took place mainly due to both area growth and productivity growth, while for two other vegetables, namely, cabbage and cauliflower the production growth

occurred mainly due to area growth in West Bengal.

Instability

In our study, for the convenience of analysis, the instability has been divided into three categories like, low instability, medium instability and high instability on the basis of the value of Cuddy-Della Valle index. More specifically, observing the empirical results we have categorized the instability as follows:

- a) Low instability ranges between 0 to 10,
- b) Medium instability ranges between 11 to 20 and
- c) High instability implies the value above 20.

The production instability of all crops combined is found to be in low category in Burdwan as well as in West Bengal during the study period and this observation is a normal one because in crop group crop-wise instabilities may be offsetting in nature.

Table-2: Estimated Crop-wise Instability during 2000-2013

Crop	Burdwan			West Bengal		
	Area	Production	Yield	Area	Production	Yield
Aus	14.54	22.91	10.58	4.64	7.60	4.43
Aman	5.96	12.63	9.99	5.52	8.26	4.05
Boro	6.97	11.51	9.99	4.13	6.22	3.67
Wheat	28.31	31.82	8.49	3.65	8.40	4.34
Potato	9.37	34.96	32.14	6.59	21.97	21.96
Mustard	11.36	18.47	15.35	4.01	10.09	9.48
Tomato	3.70	6.32	7.88	1.79	5.16	3.69
Cabbage	1.72	1.42	9.31	1.76	2.36	3.04
Cauliflower	3.02	4.88	1.69	2.15	2.01	3.29
Brinjal	7.28	6.69	3.32	1.18	1.89	2.15
Onion	6.49	11.03	12.83	2.11	4.34	3.72
Cucurbits	9.60	6.30	14.46	1.13	3.52	3.36
Ladyfinger	7.97	8.14	1.69	1.32	2.22	1.25
Radish	33.28	29.34	21.34	2.16	2.72	2.29



Other vegetables	19.38	31.81	15.37	2.56	6.79	6.00
All Combined Vegetables	7.92	6.59	3.58	0.85	1.35	1.24
All Crops Combined	4.93	7.71	5.58	3.02	4.00	3.74

In regard to individual crops the production instabilities of aman (12.63), boro (11.51) and mustard (18.47) are found to be in medium category, while for other types of traditional crops, namely, aus (22.91), wheat (31.82) and potato (34.96) the production instability lies in the category of high in the district. The production instability for each of all types of traditional crop (except potato) belongs to the category of low in West Bengal; the production instability in potato is having highest value of 21.97 (Table 2).

The production instability of vegetables like, tomato, cabbage, cauliflower, brinjal, cucurbits, ladyfinger and all vegetables combined are found to be in low category, while the instabilities of other vegetable groups under study like radish and other vegetables group lie in the category of high in Burdwan (Table 2). Onion here registered medium instability in production. In West Bengal the production instabilities for all

types of vegetable or vegetable groups are found to be low during the study period.

Further we have estimated the relationship between growth and instability. From Table-3 we see that there are 21 crops or crop groups establishing negative relation between growth and instability (i.e., high growth is associated with low instability or low growth is associated with high instability). In respect of their positive relation we get only 3 crops or crop groups and for other 10 crops or crop-groups no clear relation between growth and instability is observed. So we can conclude that in our study mainly negative relation between growth and instability is registered, which is commonly observed phenomenon in any agricultural study. This negative relation is more pronounced in the cases of vegetables which are mainly grown in a controlled environment with assured sources of irrigation.

Table-3: Relationship between Growth and Instability

	Low Instability	Medium Instability	High Instability
Significantly positive growth	Burdwan [Tomato, Cabbage, Cauliflower, Brinjal, Cucurbits, Ladyfinger, All Vegetables Combined] West Bengal [Mustard, Tomato, Cabbage, Cauliflower, Brinjal, Onion, Cucurbits, Ladyfinger, Radish, Other vegetables, All Vegetables Combined, All Crops	Burdwan [Onion]	Burdwan [Other Vegetables] West Bengal [Potato]



	Combined		
Insignificant growth	Burdwan [All Crops Combined] West Bengal [Aman, Boro, Wheat]	Burdwan [Aman]	Burdwan [Potato, Radish]
Significantly negative growth	West Bengal [Aus]	Burdwan [Boro, Mustard]	Burdwan [Aus, Wheat]

Case Study

As a case study we have purposively chosen two villages of Burdwan district. One is Aushgram and other is Bamnia. In Aushgram mainly traditional crops are grown where as vegetables are grown extensively by the farmers of Bamnia village. 10 farmers are selected from each of the villages following the method of proportionate random sampling across different strata (Small, medium and large farmers of different social groups) such that vegetables are the main agricultural products of 10 farmers and traditional crops for other set of 10 farmers. The data have been collected through personal interview on the basis of structured questionair.

The value of output is calculated by multiplying crop-wise outputs by the respect present market prices. The cost of production is also calculated and considering both actual imputed costs at farm level. The total value of production and cost of production are divided by 10 farmers to get their average values.

The farmers have produced mainly three types of traditional crop, like aus, aman and potato in a year at Aushgram village. In this village the average value of total agricultural output is Rs 137000 per acre per annum. On the other hand, the costs of production of farmers of Aushgram village per acre per annum are as follows: labour cost Rs. 41000, cost of agricultural

machineries Rs. 8800 rupees, fertilizers cost Rs. 13800, cost of pesticides Rs. 6500, seed cost Rs.22400 and irrigation cost Rs. 6000. The average cost of production is Rs. 95500 per acre per annum at Aushgram. The average profit of the sample farmers from agricultural activities is Rs. 41950 per acre per annum at Aushgram village. But in Bamnia village the sample farmers have produced mainly two types of vegetable namely, Bitter gourd and onion in a year. In this village the average value of agricultural output (comprising mainly vegetables production) is Rs. 305000 per acre per annum. The per acre annual costs of production of the sample farmers in Bamnia are Rs.88000 labour cost, Rs.5000 for agricultural machineries, Rs.14000 for using fertilizers, for pesticides Rs. 20000, for seeds Rs. 28500, and Rs.3000 for irrigation. Thus the average cost of production in second village is Rs.179500 per acre per year. So the average annual profit of the farmers is Rs.125500 per acre at Bamnia village. The respective estimated figures on value of output, cost and profit in two sample village are shown in Figure-1 and Figure-2. From these two figures it is evident that the vegetable farming is more profitable compare to the traditional farming. So the farmers in the district should switch over accordingly, of course, where it is infrastructurally feasible, to improve their economic condition. This switching over trend has been set in here as is evident from our growth analysis based on the secondary level data.

Figure-1

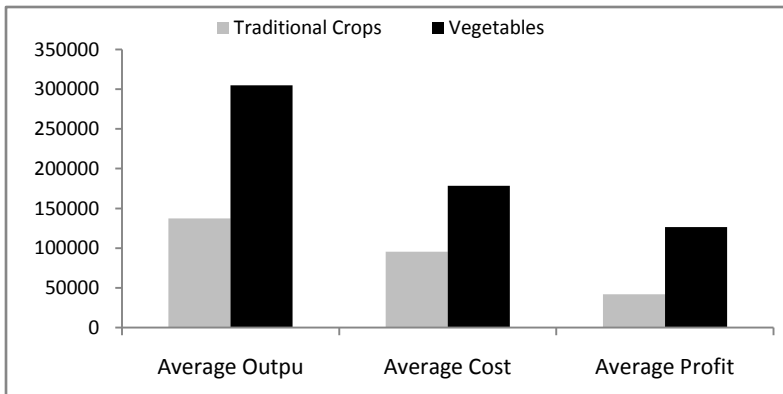


Figure-2

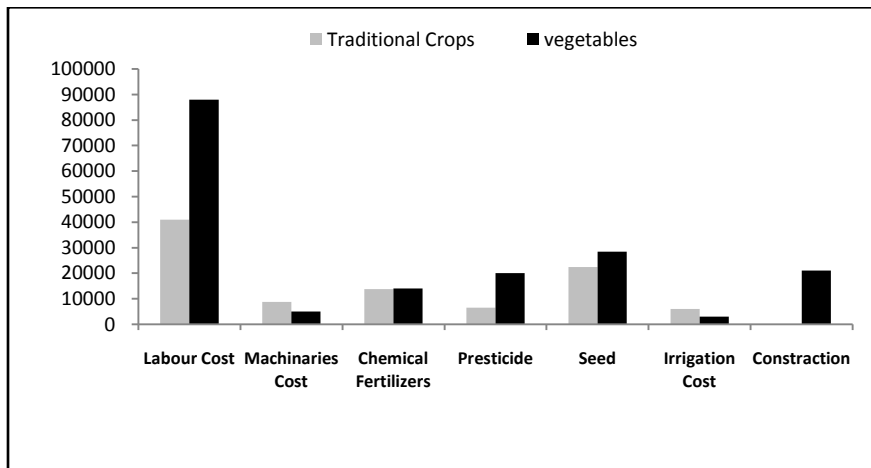


Fig. 1&2: Showing the respective estimated value of output, cost and profit in two sample village.

Conclusion

The growth rates of production are found to be negative for most of the traditional crops

in the district during the study period. The instability in the production of traditional crops is also very high here. But the growth rates in vegetables production are observed



to be high and their instabilities are low compared to the traditional crops in Burdwan. So the deceleration hypothesis remains valid in the growth rates of traditional crops in the district during the study period. Further it can be inferred that in the district vegetables farming is more stable and steady compared to traditional crops. More or less the same scenario is observed in the state in regard to growth and instability in crop-wise agricultural production. Again crop-wise growth in production mainly arises due to growth in area (i.e., through acreage expansion). Our case study also supports that vegetables farming is more profitable than the traditional farming and that might be the cause of higher growth of former than latter. The vegetable farming is gaining importance over the traditional farming in the district as well as in the state over time. If the farmers convert their cropping pattern from traditional farming to vegetables farming more, both the agricultural scenario and farmers' economic condition in the district would be improved. However, many infrastructural factors like, irrigation facility, marketing facility, storage facility etc. are to be developed for the promotion of vegetables farming in the district more. To develop those infrastructural facilities, the public funding is necessary.

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SHORT-TERM LONG-TERM AND CAUSAL IMPACT OF VOLUME AND OPEN INTEREST ON NIFTY SPOT & FUTURE INDEX

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Abstract:

According to the market expert, increase in volume with increase in price is the indicator of bull phase in the cash segment. On the other hand, increase in open interest and at the same time increase in future price is the good sign of upward trending in the derivative segment. However, increase in volume and open interest indicates that the price will go up very soon. In the equity market effect of volume and open interest is very important and indicative which is the indicator of stock specific price movement vis-a-vis overall market movement.

We have twofold objectives in this paper. First one is to investigate the short -run, long -run or casual relation between market volume and nifty spot index and second one is to examine the fact is there any short -run, long -run or casual relation exists between open interests and nifty future in the future market. We have found long run relationship in both cases. So far as short term relationship is concerned, we have found that disequilibrium is being corrected @ 9.64 % quarterly in case of nifty spot and volume and in the second experiment relating to nifty future and open interest we have found that disequilibrium is being corrected @ 3.75% quarterly. In response to our causality tests, we have found unidirectional causal relation in both cases.

Key Words:

Open Interest, Nifty Spot Index, Error Correction Model, Johanson Co integration Test, Granger Causality



I. Introduction

Equity market is considered as the highly volatile market due to its high liquidity and various trading options like day trading, swing trading and long term investment, index future & option trading, and stock specific future & option trading. Naturally, volatile nature of equity market always lures the market participant. Equity market always actively response about various sensitive financial announcement in the company or outside the company, it oscillates based on financial performance of the company. Market movement is also heavily influenced by the flow of funds. Incoming of funds either from foreign source or from domestic fount, will push the market and shaking the overall market and at the same time outflow of funds or profit making in the market exhibits the minor or major corrections or fall in the market movement. Increase in price with increase in volume in cash segment and increase in open interest in future segment is the indicator of bull phase in the market and at the same time decrease in the price with volume and open interest in respective segment is an indicator of bear phase. In this paper, we are trying to identify the influence of volume in the spot market index movement, influence of the open interest in the future market index movement. Index is the barometer of the overall market sentiment. If we can measure the effects of volume and open interest on market index, then it would be an effective trading and investment indicator in both the market segment. Our next endeavor in this paper is to capture the consequence of foreign as well as domestic funds into the market. Inflow of funds augments the market movement and outflow of funds creates the range bound or downward tendency of market movement.

This article is consisting of two sections. First we examine the influence of volume on spot market index, and then we attempt to capture the effects of open interest on future market index. In all the propositions, we have taken nifty spot and nifty future index for their popularity, wideness, huge applicability among traders and investors' world and well acceptance all over India.

II. Literature Review

Garag, A. and Ramesh, B.(2011) have explored a study to investigate the relationship between changes in future contract price and changes in the open interest. They have collected the daily price data of sixteen stocks and the nifty index for four years starting from July 2002 to June 2006. They have collected the data from bhav copies, published by the national stock exchange. To judge the relationship between these two variables they have applied correlation and t-test and concluded that there is a strong and positive correlation exists between changes in open interest and changes in single stock future price and at the same time a strong positive correlation is also found in change in open interest and nifty future. They have expressed their limitation of the study is of limited stock selection and short time period analysis.

Tachiwou, A. M. (2009) has tested the causality between stock market development and economic growth in West African Monetary union. To validate their theme of the study they have applied unit root tests, long-run Granger non-causality test as proposed by Toda and Yamamoto (1995). They have found positive co integration between financial sector development and economic growth.



Unidirectional causal relation has also been noticed between real market capitalization ratio and economic growth with a bold causal flow from the stock market development to economic growth.

Shah, A.A. et.al. (2012) has tried to model a long-run and short-run relationship among Karachi Stock Market and a set of some macroeconomic variables. They have followed Auto-regressive distributed lag (ARDL) approach for analyzing their data. They have used monthly data collected from the publications and reports of State Bank of Pakistan, International Monetary Fund, World Bank, Karachi Stock Market and web site of the trading and economics for the period from January, 2003 to April, 2009. In order to recognize the long as well as short-run relationship they have applied vector error correction model and for investigating the causal relation among the variables they introduced Granger Causality test. Based on their empirical results they came to the conclusion that macroeconomic variables like exchange rates and interest rates has a short-term effect on stock market where as all the three macroeconomic variables under study have the long-run influences on Karachi stock market index.

Lamba, A. S. (2005) has conducted empirical research to estimate the long-run and short-run relationship between South Asian and developed equity markets. Their study based on secondary data. They have collected daily data from the Bloomberg of different country's' stock indexes ranges from July, 1997 to December, 2003. They have studied South Asian indices, e.g. nifty 50 index from India, Karachi 100 index from Pakistan and all share index from Sri Lanka and for developed countries index they have taken France, Germany, UK, US and Japan stock

market data. They have applied various econometrics tools and techniques for analyzing the data and obtained the results. He has observed a very interesting result that Indian market influenced by UK, US, and Japan but Pakistan and Sri Lankan markets are not at bash during the term of their study.

Khan, G. S. and Sarker, S. M. A. E. (2014) have done a research work to introspect the dynamic relation between commodity market and capital market of India. They have taken gold price as a representative of commodity market and BSE Sensex as a proxy of Indian capital market. They have collected monthly data of 22 years ranging from April, 1991 to March 2013. They have used Augmented Dickey Fuller test for the stationarity test of the data and the data were no unit root at first difference, co integration test shows the long-term equilibrium relationship between the variables and finally the vector error correction model and wald test exhibits the bi- directional long-run relationship between the variables. Based on the results, they have concluded that gold is the safe haven for investment in India.

Asari, F.F.A.H. et.al, (2011), conducted a study on exchange rate volatility in Malaysia. The research makes an attempt to identify the relationship among interest rate, inflation rate and exchange rate. They have used time series data for the period of 11 years starting from 1999 to 2009. ADF test has been applied to test the Stationarity of the data set. Cointegration test and vector error correction model have been used to judge the long term association and the short term dynamics of the variables and at last granger causality test has been introduced to know the causal relation



among the variables. Impulse Response Function (IRF) has also been used for explaining the shock among the variables. Findings of their study reveals that granger cause the inflation rate on interest rate and interest rate also granger cause on exchange rate. Further, the relationship had been found to be long-run

Mohanasundaram, T. et.al.(2015) made an attempt to found the possibility of short term as well as long term association among the three countries stock market indices. They have taken market index data from India (NIFTY), South Africa (JALSH) and USA (NASDAQ) ranging from 2004 to 2014. They have applied a number of time series mechanisms to judge the short term as well as long term relationship and causal relation amongst the stock market indices. Cointegration test reject the existence of long run relationship but the VAR model indicates a short run association between JALSH and NIFTY. Granger Causality test result shows that there is a causal relation between South African's and India's indices.

Plihal, T.(2016) have studied the causality between DAX, the stock market index of Germany and some selected macroeconomic variables. He has analysed the monthly data of six macroeconomic variables e.g. interest rate, trade balance, industrial production, inflation, money supply and exchange rate for the period covering 16 years. Various time series testing tools have been applied and lastly Toda-Yamamoto (1995) method has been applied for testing granger causality and validating their result. The study reveals that there exists interactive relation among the variables and some bi-directional causal relation. In conclusion he argued that stock market of Germany is

informationally efficient and follow the efficient market hypothesis rule.

Alp, O.S.et.al.(2016) have explored an empirical investigation for analyzing the Turkish stock market under Arbitrage Pricing Theory viewpoint. The main objective of the study is to inspect the expected return of Turkish stock market with arbitrage pricing for the period of 2000 to 2012. They have functioned with time series techniques like cointegration test, vector error correction model etc. They found that all the significant macroeconomic variables varies sector wise and have a long term consequence in determining stock indices. They have also pointed out that experimental result of arbitrage pricing theory offered great inference for analyzing Turkish stock market.

Hasan, A. et.al., (2009) have intended to find out the long run relationship between equity price and monetary variables of pakistani equity market. They have taken data of eleven years ranging from 1998 to 2008. Multivariate cointegration, granger causality test, impulse response analysis and variance decomposition analysis have been applied for analyzing the data. Their study reveals that unidirectional granger causality between the equity market and monetary variables. Impulse response analysis indicates the interest rate shock has a negative impact on equity market and variance decomposition analysis advise interest rate, exchange rate and money supply shocks are the considerable source of volatility in equity returns.

Antonios, A.(2010) have tried to examine the relationship between stock market development and economic growth of Germany. The study consists of a long period



time series data of 42 years covering the 1965 to 2007. He has applied Johansen cointegration test to evaluate the long run relationship between these variables and vector error correction model for their short run relationship. Granger Causality test has been applied to identify the causal relation between the variables. The study reveals that there is a long run association among the variables and VECM shows the long run as well as short run causality. Unidirectional causality has been found between stock market development and economic growth and the direction towards stock market development to economic growth.

III. Research Questions

We investigate two distinct research questions:

- I. Is there any short -run, long -run or casual relation between market volume and nifty spot index?
- II. Is there any short -run, long -run or casual relation between open interests and nifty future index?

IV. Data Source and Methodology

In order to address research question I, we have used quarterly closing nifty spot index of 65 quarters from 30.06.2000 to 30.06.2016 and corresponding volume data from National Stock Exchange (NSE) historical data base, Yahoo finance and Trend Solution (www.stoxtrend.org) has crossed checked with money control.com.

In order to address research question II, we have used quarterly closing nifty future index of 54 quarters from 31.03.2003 to 30.06.2016 and corresponding Open Interests data from National Stock Exchange (NSE)

historical data base, Yahoo finance and Trend Solution (www.stoxtrend.org) has crossed checked with money control.com.

In order to satisfy our objectives first we check the stationarity of the series by use of unit root test. Augmented Dickey Fuller Test and Philip-Perron test have been applied for unit root test. Then depending on their order of integration we apply the Johansen co-integration test for identification of long-term association. Long-term co-integration detection helps us for the next few tests for short-term relation and causal relation. For this purpose we have applied Error Correction Model (ECM), Pair wise Granger causality test in our proposed model whenever our investigation demanded it.

V. Findings and Discussion about various tests relating to Nifty Spot and Volume

A. Descriptive Statistics

Present study consists of two variables Nifty spot and Volume. First we examine the normality of the variables and wish to identify the various general statistical features of the data set. Exhibit-1 shows the descriptive statistics where we found measurement of mean, median, maximum, minimum value, standard deviation, skewness, kurtosis of the data series. We have applied Jarque-Bera test for testing the normal distribution of the data series.

The skewness value nearer to '0' as observed in all the variables viz; nifty spot (0.18), volume (0.05) and kurtosis within '3', nifty spot (1.85) and volume (1.55) indicate that the variables are normally distributed. More specifically we have applied Jarque-Bera test to judge whether the data set followed normal distribution or not, we have



found p-value of all the variables under Jarque-bera model is more than 5 percent. So we accept the null hypothesis of normal distribution assumption meaning that the data set having the presence of normality.

Exhibit-1: Descriptive Statistics of Nifty Spot and Volume

Measures	Nifty Spot	Volume
Mean	4156.768	2.81E+10
Median	4291.100	3.54E+10
Maximum	8491.000	6.96E+10
Minimum	913.8500	1.03E+09
Std. Dev.	2374.982	2.23E+10
Skewness	0.181362	0.051659
Kurtosis	1.857674	1.551030
Jarque-Bera	3.890457	5.715097
Probability	0.142955	0.057409
Sum	270189.9	1.82E+12
Sum Sq. Dev.	3.61E+08	3.18E+22
Observations	65	65

B. Graphical Representation of Nifty Spot and Volume

Before applying any econometric analysis we have to check the stationarity of the data

set to avoid the spurious regression result. Data with unit root may cause wrong estimation. So we should first proceed to check the unit root of the data set. The basic criteria of time series data desires that it should be stationary that means no unit root in the data series. If the data change its mean and variance overtime meaning that it has contained unit root and the result from these data set may cause misleading forecasting. Before exploring any econometric tool for testing and interpreting the data, we have introduced the widely accepted and simplest method of measuring stationarity through plotting the data set into a line chart. From the chart (Figure-1 and Figure-2), apparently we can visualize the position of the data series. Time series data treated as stationary, if the mean and variance are not varying over time, i.e. with the passing of time it has constant mean and variance. "Series shows no tendency to drift upwards overtime, it is stationary in mean and if the series starts to gyrate such that overtime the amplitudes of the peaks and troughs increase, then the series is non-stationary in variance" (Bhaumik, S.K.,2015, p.264).

Figure-1

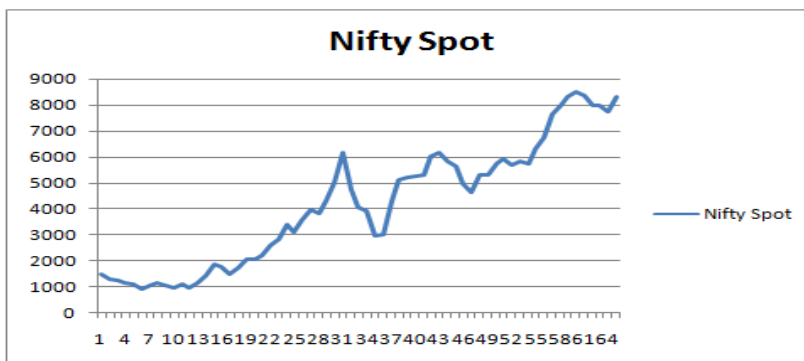
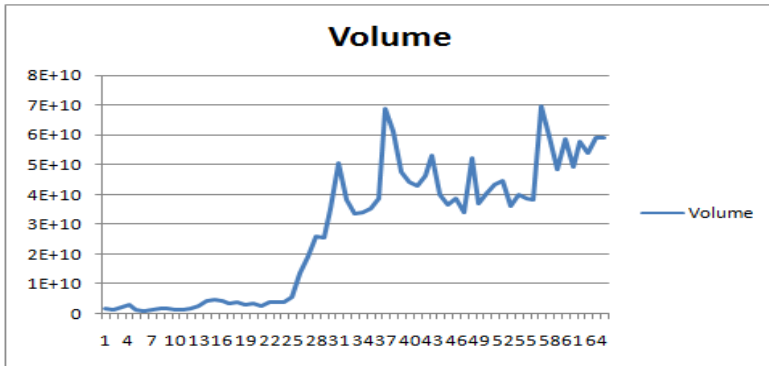


Figure-2



Line chart of all the variables in this phase have shown that they have no constant mean and variance but exhibit an upward trend, which confirms that they have no constant mean. Vertical fluctuations (ups and downs) throughout the chart also indicate the deviations which mean they have contained varying variance overtime. From this discussion we can conclude that all the variables have the trend and unit root meaning that they are non-stationary data series.

C. Unit Root Test

Unit root test is very important aspect to judge the behavior of a variable. To avoid the spurious regression we test the data set. In our study we applied Augmented Dickey-Fuller (ADF) test and Phillips-Perron (PP) Test. Though there are so many tests for unit root but we applied these two for their wide application in this field and popularity. We applied both the test on same data set to establish the robustness of the test. Exhibit 2 & 3 depicts the ADF test statistic at level and 1st difference at trend and without trend. In the series both the variables have

the unit root at level meaning that non-stationary showing that test statistic value is higher than that of critical value at 1 percent confidence level with insignificant p value. At the 1st difference price both the variables are stationary having no unit root. Here the critical value is greater than ADF test statistic at 1 percent level of significance. So the result of ADF test exposed that both the variables are non-stationary at level price but they become stationary at their 1st difference price and both are integrated of same order i.e. I(1) series.

Phillips-Perron (PP) Test is a nonparametric test. This method differs from the ADF test of unit root, it just a modification of ADF taking into account the less restrictive nature of error process. PP test controls the effect of serial correlation while testing the stationarity but PP test shows the asymptotic distribution. In the Exhibit 4 & 5 PP test statistic of level and 1st difference has been shown in both, trend and without trend. First variable of the series Nifty Spot exhibit that it has unit root at level price (Adj. t-Stat > Critical value, p value is not



insignificant) and become stationary at 1st difference price (Adj. t-Stat <Critical value, p value is significant) where as the second variable of the series Volume shows that this variable has no unit root both at its levels and 1st difference price, so it does not

require any differencing. The summary of the PP test is that all the variables of the studied series do not have any unit root and they are stationary at 1st difference price level.

Exhibit 2: Augmented Dickey-Fuller test statistic - Without Trend

Variables	At Level			At 1 st Difference		
	Test Statistic	Critical Value (1%)	Prob.	Test Statistic	Critical Value (1%)	Prob.
Nifty Spot Index	-0.164814	-3.536587	0.9370	-6.344846	-3.538362	0.0000
Volume	-1.379982	-3.536587	0.5867	-9.835323	-3.538362	0.0000

Exhibit 3: Augmented Dickey-Fuller test statistic - With Trend

Variables	At Level			At 1 st Difference		
	Test Statistic	Critical Value (1%)	Prob.	Test Statistic	Critical Value (1%)	Prob.
Nifty Spot Index	-3.745819	-4.110440	0.0264	-6.321623	-4.110440	0.0000
Volume	-3.442498	-4.110947	0.0548	-9.756608	-4.110440	0.0000

Exhibit 4: Phillips-Perron Test statistic - Without Trend

Variables	At Level			At 1 st Difference		
	Adj. t-Stat	Critical Value (1%)	Prob.	Adj. t-Stat	Critical Value (1%)	Prob.
Nifty Spot Index	-0.290954	-3.536587	0.9199	-6.281630	-3.538362	0.0000
Volume	-1.058183	-3.536587	0.7271	-11.25767	-11.25767	0.0000

Exhibit 5: Phillips-Perron Test statistic - With Trend

Variables	At Level			At 1 st Difference		
	Adj. t-Stat	Critical Value (1%)	Prob.	Adj. t-Stat	Critical Value (1%)	Prob.
Nifty Spot Index	-3.004607	-4.110947	0.1391	-6.256487	-4.110440	0.0000
Volume	-3.319221	-4.107947	0.0724	-11.14940	-4.110440	0.0000

D. Johansen Cointegration test

All the variables are integrated at first difference. Now we proceed for the next

test that is Johansen Cointegration test. We want to judge the long term relationship among the variables. Result of Johansen test, first we observe the Trace Statistic.



Here null hypothesis is None, actually none denotes the rejection of hypothesis at the 5 percent level that is there is no co integration as the trace statistics is more than critical value. We reject null hypothesis and as the p value is less than 5 percent. Secondly, at most one, where trace statistics is found to be less than critical value; we accept null hypothesis meaning that there is one co integrating equation. It is also supported by the p value which is greater than 5 percent. So all the variables are co integrated and they have a long run association among them.

The second criterion of Johansen Cointegration test is Max-Eigen value also shows that one co integrating equation. Here also we reject the null hypothesis as the Max-Eigen statistic is more than critical value and the p value is less than 5 percent. On the other hand at most one, where Max-Eigen statistic is less than critical value and the p value is greater than 5 percent which also support that there is one co integrating equation at 5 percent level. Both the criteria of Johansen Cointegration test indicates the same that the variables are co integrated and they have a long run relationship.

Exhibit 6: Result of Cointegration Test

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.254464	16.09434	15.49471	0.0406
At most 1	0.015730	0.824474	3.841466	0.3639

Trace test indicates 1 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 No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.254464	15.26986	14.26460	0.0346
At most 1	0.015730	0.824474	3.841466	0.3639

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Exhibit 7: Error Correction Model

Dependent Variable: D(Nifty Spot)

Method: Least Squares

Sample (adjusted): 2 65

Included observations: 64 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	78.48577	49.00020	1.601744	0.1144
D(VOLUME)	2.95E-08	6.18E-09	4.771428	0.0000
U(-1)	-0.096486	0.050443	-1.912774	0.0605

Our selected variables in this present study exhibit the long run association and co integrated so we apply the Error Correction Model (ECM) to predict the short term dynamics. By applying Johansen Cointegration test we confirmed that all the variables have the long run association, now ECM provides us the short term relation between the variables. Our model is

$$D(\text{Nifty Spot}) = A_1 + A_2 * D(\text{Volume}) + A_3 Ut_{-1} + \mu$$

Where, Closing Price and Volume are the 1st Difference variables, A₁ is the intercept, A₂ is the short run coefficient, Ut₋₁ is the one period lag residual, A₃ is the coefficient of error correction term and μ is the error term.

Here D (Nifty Spot) is the 1st difference of the variables and our dependent variables. C is the constant and D (Volume) is the 1st difference of the second variable and U (-1) is the 1st difference of the error correction term i.e. one period lag of the residual. In

our study coefficient of D (Volume) is short term coefficient and it is significant at 5 percent level. So D (VOLUME) is a significant variable for explaining our dependent variable D (Nifty Spot) in short run. Here the error correction term is U (-1). The value of the coefficient of error correction term is -0.0964 that means the error correction term correct the disequilibrium of the model at a speed of 9.64 percent quarterly. The value of the coefficient of error correction model is negative but is found to insignificant at 5 percent level of confidence.



Exhibit 8: Pair wise Granger Causality Tests

Null Hypothesis:	Obs	F-Statistic	Prob.
DV does not Granger Cause DNS	56	0.51183	0.8401
DNS does not Granger Cause DV		3.29011	0.0058

Simple regression and cointegration results indicate the dependency and the long run association of two variables but these does not provide the answer of either existence or direction of causal relationship. In our study we have applied pair wise granger causality test on two variables quarterly Closing Value of Nifty spot index and quarterly volume associated with the index price. Exhibit 8 indicates the result of 56 observations. The F-Statistic of 'VOL does not Granger Cause Nifty Spot' is 0.51183 with a p value 0.8401. It implies probability value is above 5 percent level. Hence we accept the null hypothesis and reject the alternative hypothesis. Which mean Volume and Price have no causal relation and Volume does not cause the price. However, we observe a different scenario in relation to nifty spot and volume. There also a uni-directional causal relation between the variables at 5 percent level of significance. Here nifty spot index $\xrightarrow{\text{cause}}$ the volume.

VI. Findings and Discussion about various tests relating to Nifty Future and Open Interest

A. Descriptive Statistics of Nifty Future and Open Interest

In this section we have taken two variables nifty future and open interest before applying any test we examine whether these variables are follow normal distribution or not and the essential statistical features of the data set. Exhibit 9 shows the descriptive statistics where we found measurement of mean, median, maximum, minimum value, standard deviation, skewness, kurtosis of the data series.

As per the descriptive statistics nifty future having skewness value 0.01 and kurtosis value 2.08, another variable open interest have shown the skewness 0.34 and kurtosis 2.38 indicate that all the variables in this phase follows normal frequency distribution and Jarque-Bera test statistic also affirms that p-value of the test is higher than that of 5 percent significance level in both the case (0.38) meaning that nifty future and open interest follows normal distribution.

Exhibit 9: Descriptive Statistics

Measures	Nifty Future	Open Interest
Mean	4779.317	18606049
Median	5055.575	19395250
Maximum	8534.750	42544200
Minimum	980.5000	2399200.
Std. Dev.	2138.393	10026410
Skewness	0.012503	0.346685
Kurtosis	2.085007	2.389372
Jarque-Bera	1.885132	1.920665
Probability	0.389627	0.382766
Sum	258083.1	1.00E+09
Sum Sq. Dev.	2.42E+08	5.33E+15
Observations	54	54

B. Graphical Representation of Nifty Future and Open Interest

In this phase we have measured the impact of open interest on Nifty future index. Our descriptive statistics table supports that the variables followed normal distribution. Now we apply graphical presentation of the variable to visualize the apparent position of the variables. The graphical representations of nifty future and open interest have shown that they have no constant mean and variance. Nifty future has a clear uptrend throughout the study period but open interest shows the uptrend at the beginning and end with a clear downtrend. So we conclude that both the variables have varying mean and variance overtime as shown in the figure 3 and 4 but they have trend throughout the study period. Here we have applied ADF and PP test for examining the unit root of the variables in both ways intercept without trend and intercept with trend.

Figure-3

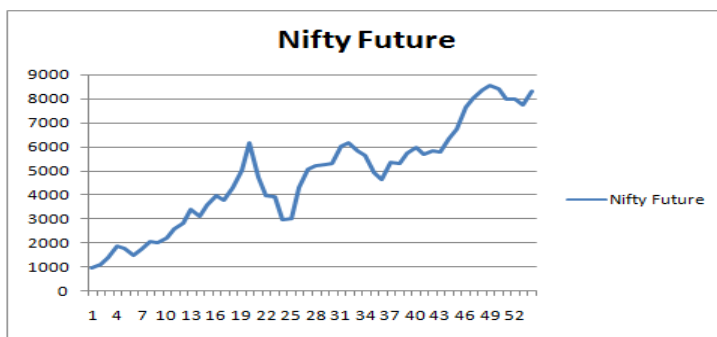
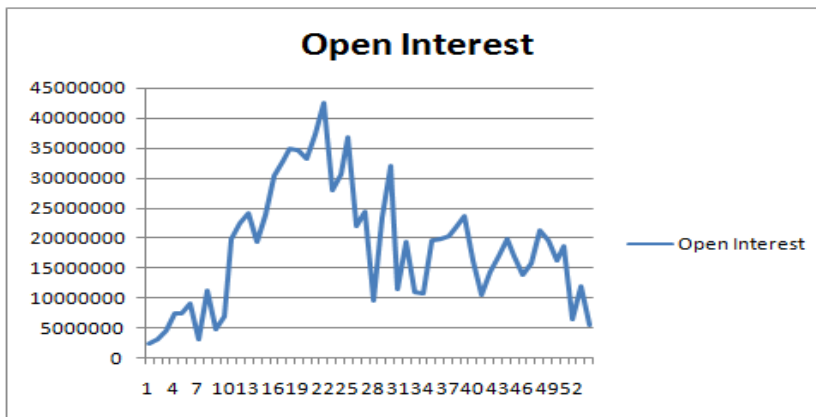


Figure-4



C. Unit Root Test

Unit root test is very important aspect to judge the behavior of a variable. To avoid the spurious regression we test the data set. In this phase of our study we have applied ADF test and PP Test. Exhibit 10 & 11 depicts the ADF test statistic at level price and 1st difference in both situation, trend and without trend. In the series both the variables have the unit root at level meaning that non-stationary showing that test statistic value is higher than that of critical value at 1 percent confidence level with insignificant p value. At the 1st difference price both the variables are stationary having no unit root. Here the critical value is greater than ADF test statistic at 1 percent level of significance. So the result of ADF test exposed that both the variables are non-stationary at level price but they become stationary at their 1st difference price and both are integrated of same order i.e. I(1) series.

Exhibit 12&13, PP test statistic of level price and 1st difference price has been shown. First variable of the series Closing Price exhibit that it has unit root at level price (Adj. t-Stat > Critical value, p value is not insignificant) and become stationary at 1st difference price (Adj. t-Stat <Critical value, p value is significant) where as the second variable of the series Volume shows that this variable has no unit root both at its levels and 1st difference price, so it does not require any differencing. The summary of the PP test is that all the variables of the studied series do not have any unit root and they are stationary at 1st difference price level.



Exhibit 10: Augmented Dickey-Fuller test statistic Without Trend

Variables	At Level			At 1 st Difference		
	Test Statistic	Critical Value (1%)	Prob.	Test Statistic	Critical Value (1%)	Prob.
Nifty Future	-0.993567	-3.560019	0.7493	-5.813320	-3.562669	0.0000
Open Interest	-2.758211	-3.560019	0.0713	-10.17941	-3.562669	0.0000

Exhibit 11: Augmented Dickey-Fuller test statistic With Trend

Variables	At Level			At 1 st Difference		
	Test Statistic	Critical Value (1%)	Prob.	Test Statistic	Critical Value (1%)	Prob.
Nifty Future	-3.518232	-4.144584	0.0478	-5.752278	-4.144584	0.0001
Open Interest	-2.662170	-4.140858	0.2560	-10.37444	-4.144584	0.0000

Exhibit 12: Phillips-Perron Test statistic Without Trend

Variables	At Level			At 1 st Difference		
	Adj. t-Stat	Critical Value (1%)	Prob.	Adj. t-Stat	Critical Value (1%)	Prob.
Nifty Future	-1.058555	-3.560019	0.7255	-5.749539	-3.562669	0.0000
Open Interest	-2.571282	-3.560019	0.1053	-10.71794	-3.562669	0.0000

Exhibit 13: Phillips-Perron Test statistic With Trend

Variables	At Level			At 1 st Difference		
	Adj. t-Stat	Critical Value (1%)	Prob.	Adj. t-Stat	Critical Value (1%)	Prob.
Nifty Future	-2.923565	-4.140858	0.1637	-5.684676	-4.144584	0.0001
Open Interest	-2.399888	-4.140858	0.3754	-11.62414	-4.144584	0.0000

D. Johansen Cointegration test

All the variables are integrated at first difference. Here also we have applied Johansen Cointegration test to judge the long term relationship among the variables. Result of Johansen test, first we observe the Trace Statistic. Here null hypothesis is None, that is there is no co integration as the trace statistics is more than critical value. We reject null hypothesis and also the p value is less than 5 percent. Secondly, at most one, where trace statistics is less than critical value; we accept null hypothesis meaning that there is one co integrating equation. It is also supported by the p value which is greater than 5 percent. So all the variables are co integrated and they have a long run association among them.



The second criterion of Johansen Cointegration test is Max-Eigen value also shows that one co integrating equation. Here also we reject the null hypothesis as the Max-Eigen statistic is more than critical value and the p value is less than 5 percent. On the other hand at most one, where Max-Eigen statistic is less than critical value and the p value is greater than 5 percent which also support that there is one co integrating equation at 5 percent level. Both the criteria of Johansen Cointegration test indicates the same that is the variables are co integrated and they have a long run association.

Exhibit 14: Result of Cointegration Test

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.315626	17.44360	15.49471	0.0251
At most 1	0.008350	0.377311	3.841466	0.5390

Trace test indicates 1 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 No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.315626	17.06629	14.26460	0.0176
At most 1	0.008350	0.377311	3.841466	0.5390

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values



Exhibit 15: Error Correction Model

Dependent Variable: D(Nifty future)
 Method: Least Squares
 Sample (adjusted): 2 54
 Included observations: 53 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	135.9877	67.12148	2.025994	0.0481
D(OI)	-1.46E-05	9.82E-06	-1.489848	0.1425
U(-1)	-0.037541	0.032706	-1.147834	0.2565

Our selected variables in this present study exhibit the long run association and co integrated so we apply the Error Correction Model (ECM) to predict the short term dynamics. By applying Johansen Cointegration test we confirmed that all the variables have the long run association, now ECM provides us the short term relation between the variables. Our model is

$$D(\text{Nifty Future}) = A_1 + A_2 * D(\text{Open Interest}) + A_3 U_{t-1} + \mu$$

Where, Closing Price and Volume are the 1st Difference variables, A₁ is the intercept, A₂ is the short run coefficient, U_{t-1} is the one period lag residual, A₃ is the coefficient of error correction term and μ is the error term.

Here D (Nifty Future) is the 1st difference of the variables and our dependent variables. C is the constant and D (Open Interest) is the 1st difference of the second variable and U (-1) is the 1st difference of the error correction term i.e. one period lag of the residual. In our study coefficient of D (Open

Interest) is -1.46 and p-value is 0.1425, which is above 5 percent level. It is insignificant at 5 percent level. So D (Open Interest) is not a significant variable for explaining our dependent variable D (Nifty Future) in short run. Here the error correction term is U (-1). The value of the coefficient of error correction term is -0.0375 that means the error correction term correct the disequilibrium of the model in a speed of 3.75 percent quarterly. The value of the coefficient of error correction model is negative but insignificant at 5 percent level of confidence.



Exhibit 16: Pairwise Granger Causality Tests

Dependent Variable: D(Nifty future)
Method: Least Squares
Sample (adjusted): 2 54
Included observations: 53 after adjustments

Null Hypothesis:	Obs	F-Statistic	Prob.
DOI does not Granger Cause DNF	47	3.03234	0.0175
DNF does not Granger Cause DOI		0.71134	0.6428

Simple regression and cointegration indicates the dependency and the long run association of two variables but these does not provide the answer of causal relation and the direction of causal relation. Granger Causality Tests presented the causal relation and the direction of causal relation. In our study we have applied pair wise granger causality test on two variables quarterly Closing of Nifty Future Index and quarterly Open Interest associated with the Future Index. Exhibit 16 indicates the result of 47 observations. The F-Statistic of 'Open Interest does not Granger Cause Nifty Future' is 3.03234 with a p value 0.0175, exhibits the probability value is below 5 percent level so we reject the null hypothesis and accept the alternative hypothesis. That means open interest does cause nifty future index. The F-Statistic of 'Nifty Future does not Granger cause Open Interest' is 0.71134 with a p-value 0.6428 > 5 % indicates the acceptance of null hypothesis. It implies that Nifty Future and Open Interest have the uni-directional causal relation? That means Open Interest cause Nifty Future.

VII. Conclusion & Policy Implications

In this paper, first we have examined the influence of volume on spot market index, and then we have attempted to capture the effects of open interest on future market index. We have applied a number of econometric tools. We conclude that our ADF test and PP test results have found to be non stationary at level and stationary at first difference in intercept as well as trend and intercept in both the cases. In both investigation Johansen Cointegration test result witnessed long run relationship. Error Correction Model (ECM) shows that there is a short-run relationship between volume and nifty spot and it is significant. This model also depicted that the disequilibrium is being corrected @ 9.64 percent and @ 3.75 percent quarterly in both the proposition respectively.

Granger causality test result shows unidirectional causal relation between nifty spot index with volume and open interest with nifty future. The direction of the causality is nifty spot index causes volume



and open interest causes nifty future and not otherwise.

Our research could be used in strategy formulation by all types of traders as well investors, domestic as well as foreign. Movement in volume or open interest may be considered to be of crucial significance to all of them.

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