A STUDY ON EXAMINING CAUSAL RELATIONSHIP OF BROAD MARKET INDICES WITH SPECIAL REFERENCE BOMBAY STOCKS EXCHANGE

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ABSTRACT

The study entitled "EXAMINING CAUSAL RELATIONSHIP OF BROAD MARKET INDICES WITH SPECIAL REFERENCE BOMBAY STOCKS EXCHANGE" was carried out with the objective to examine the co-movements of Broad Market index in BSE. For the purpose of this study sample indices such as S&P BSE 100, S&P BSE 200, S&P BSE 250 LARGE MIDCAP, S&P BSE 500 and S&P BSE ALL CAP were considered. The daily return data of the selected sample indices for the period from 1st January, 2016 to 31st December, 2020 were taken for the purpose of analysis. The statistical tools such as descriptive statistics, chart and correlation were used in this study to examine the co-movement of sample indices during the study period. From the result of analysis, it is found that there was a co-movement between sample indices during the period of study. The results of correlation analysis recorded that the sample thematic indices were recorded significant relationship with each other during the study period. It indicated that the increase in one index lead to increase in other indices when there was an occurrence of positive correlation. While there was a negative correlation, it exposed the opposite reaction among the indices. It is suggested that the investor need to analyse the linkages exist between the indices of stock market. This study suggested to consider the broad market indices in make the investment portfolio. Hence, the policy makers and regulators of Indian capital markets should pay attention to the performance of the market. It guides the investors to make better portfolio diversification for the betterment of their investment.

Keywords: *Co-movements, Stock Market, Broad Market Index, Investment*

1. INTRODUCTION

India has emerged as the fastest growing major economy in the world and is expected to be one of the top three economic powers of the world over the next 10-15 years, backed by its strong democracy and partnerships. India is today one of the most vibrant global economies, one of the most prominent has been take place by the Indian Stock market. The recent global economic situation has witnessed immense highs and lows including some unfortunate happenings related to stock market. Indian Stock market is a physically existing institutionalized set up where instruments of security market such as shares, bonds, debentures, securities, etc. were traded. The major functions of Indian stock market are providing liquidity and marketability to existing securities. It helps to provide the value for securities and safety transactions and fair dealing in buying and selling of securities. The Exchange while providing an efficient market also upholds the interest of investors and ensures Redressal of their grievances whether against the companies or its own member – brokers. There are 23 Stock Exchange in India as per the Security Exchange Board of India (SEBI). Among them Bombay stock exchange is the biggest stock exchange in India accounts for almost 75% of total stocks in India and there are four indices connected with the BSE such as Sensex, BSE-200, BSE-500, and National Index. The Indian stock market plays a prominent role in the growth of the Indian economy. The present study on "Casual Relationship and Volatility of BSE Index with special reference to Indian stock market" selected five indexes such as BSE AUTOEX, BSE BANKEX, BSE CORBANEX, BSE GREENEX and BSE SENSEX to certain the relationship between the indices and impact of one indices with the other indices.

2. OBJECTIVES OF THE STUDY

The primary objective of the study is to investigate the short-run and long-run linkage between BSE Board. The following secondary objectives are formulated to realize the primary objective.

- To study about the performance and importance of stock market in India
- To know about the Board Market indices in Bomaby Stock Exchange

- To analysis the return of the BSE sensex and Board market indices
- To study the Causal Relationship of BSE indices with BSE Sensex.

3. REVIEW OF LITERATURE

JayshrceMandhviya (2014) this paper mainly analyses the degree of influence by global stock market on Indian Stock market. This study uses ten major indices they are Sensex, SSE composite index, nifty, NYSE, NASDAQ, Ilang Seng, 500, DAX. TOPIX, Dow Jones, FTSEIOO. The main objective is to find the level of dependency of Indian stock market & the magnitude of changes that occur in Indian stock market due to changes in Global stock market. The time frame of the study is from Jan 2000 to March 2003. The tools used are multiple correlation & multiple regression models. & the descriptive statistical tools like mean, standard deviation, coefficient of variation, Skewness & kurtosis was computed. The study found that there is a high level of integration between the Indian & International markets. It also revealed that Sensex had strong integration with DAX, TOPIX, NASDAQ & Ilang Seng whereas moderate integration with NYSE, FTSE 100, Dow Jones & SSE.

Mr. Vijaian&& Mr. Pradeep Kumar (2015) this study mainly focus on some of the top leading world indices with that if Indian indices. The main objective of this study is to find the relation between the indices using regression equation & also to find correlation among the selected indices. For their study they have used the weekly data of BSE, FfSE, HANG SENG, KOSPI, NIVOCIE, and NASDAQ & DOW JONES for the period of 5years. The correlation coefficient & coefficient of determination was found & analyzed. The results obtained show that there is no correlation between BSE & NASDAQ but there is a significant relationship between BSE & others. This paper focuses on the fact that any new information spreads in the market rapidly & therefore affects the market. This type of analysis conducted is very useful for the investors to take decisions. It was also found that Sensex is strongly related to Asian stock markets & so each of them affects each other positively. It has also been found that FDI & Fll has removed the insulations on the stock markets & enabled it to integrate & relate with other stock markets.

Karam Pal Narwal, Ved Pal Sheera & Ruhee Mittal(2017) Volatility Contagion between India & Selected Stock Markets-The present study is an attempt to examine the linkage between the financial markets of developing & developed economies. For the purpose, the 1nterdependence between 1ndian implied volatility 1ndex & six 1nternational indices (V1X, VCAC, VDAX-NEW, VSMI, VXJ & VSTOXX) is investigated in the framework of the volatility transmission & spill over mechanism. The bivariate [VAR (p)] system & BEKKGARCH model are employed to quantify the given phenomenon of interdependence. The results indicate that there is an important relationship between 1V1X & V1X, as 1V1X responds strongly to a shock in V1X index & this effect continues for about six days, post which it tapers off & vice versa. Granger causality test confirms bidirectional causality between the 2 volatility indices. At individual level, it is found that there are bidirectional crossshock spillover effects between India-America, India-Germany, India-Switzerland& & India Eurozone markets & bidirectional volatility linkages between IV1X & other indices, viz, V1X, VCAC & VSTOXX.The importance & implication of the study lies in the usefulness of the measurement of second moment & its behaviors which has been an important input in financial decision making. For instance, it can provide valuable input for developing better portfolio diversification strategies.

Dr.S.Baranidharan (2018) in his study entitled "A causal relationship and volatility of BSE index with special reference to Indian stock market", as per the Central Statistics Organization and International Monetary Fund, India has emerged as the fastest growing major economy in the world and by its strong democracy and partnerships the Indian economy is expected to be one of the top three economic powers of the world over the next 10 – 15 years. Trade liberalization, financial liberalization, tax reforms and opening up to foreign investments were some of the important steps which also include share market, which helped the economy to gain momentum. The essential part of an Indian economy is the movement of shares in Stock exchange. Stock Exchange offers a ready market for buying and selling the securities. Share Bazaar is the business market with crores of rupees being put to stake. The Bombay Stock Exchange, the premier share market, registers dealings worth several hundred crore a day. The purpose of this study is to analyze the Casual Relationship and Volatility of BSE Index with special reference to Indian stock market through the data collected from the period of April 2010 to March 2018. Using SPSS software, the Descriptive statistics and Correlation developed which shows the relationship between share price & various factors affecting the same and also its casual relationship are very helpful for policy makers, Institutional investors, traders and all other stakeholders to take investment decision.

4. RESEARCH METHODOLOGY

Sample Selection

The present study tests the behaviour of Board market indices listed in BSE. As on 30st, March 2021. Based on its turnover value in the market, it is decided to consider top 10 indices from BSE Selected index. The details of sample indices and sample companies listed in those sample indices and value of Turnover are given in

Index adopted in the Study

- S&P BSE 100
- S&P BSE 200
- S&P BSE 250 Large Mid cap
- S&P BSE 500
- S&P BSE ALL_CAP

Sources of Data

The study was mainly based on secondary data i.e, daily returns of BSE board market indices. The details regarding sample indices were collected from BSE official website www.bseindia.com while the daily returns of sample indices. The other required data were collected from various websites, books and journals.

The experts in the field of Finance and Stock Market and the officials of companies were contacted by the Researcher. Their views and valuable information helped the Researcher to validate the findings. The consultations with the experts helped the Researcher to fine tune the model formulation. Some of the suggestions offered were based on the interaction with the experts.

5. FINDINGS

(a)Descriptive Statistics

Descriptive Statistics was used to identify the measure of average return and risk. Measures of central tendency include the mean while measures of variability include standard deviation, correlation, augmented dickey-fuller test. Descriptive Statistics provided a useful summary of security returns and the historical account of return behavior. Although past information is useful in any analysis, one should always consider the expectations of future events.

i) Mean

Mean is the average value of the series, obtained by adding up the series and dividing by the number of observations. It is the most common measure of central tendency.

The mean is calculated by using the following formula.

$$\text{Mean } (\bar{x}) = \frac{\sum xi}{n}$$

Where,

$\bar{x}$ = represents the mean,

$\sum$ = Symbol of Summation

Xi =Value of the i^{th} item x, i= 1, 2, 3 ….n,

n=total number of items

ii) Median

The median is the middlemost observation of a set of data that has been arranged in order of magnitude.

- In n is odd then the median = value of $\left(\frac{n+1}{2}\right)$th observation.
- If n is even then the median = arithmetic mean of $(\frac{n}{2})^{th}$ and $(\frac{n}{2}+1)^{th}$ observation.

iii) Mode

In the case of grouped frequency distribution, calculation of mode just by looking inti the frequency is not possible. To determine the mode of data in such cases we calculate the modal class. Mode lies inside the modal class. The mode of data is given by the formula;

where,

Mode = l + $(\frac{f2-f0}{2f-f0-f2}) * h$

Where,

l = lower limit of the modal class

h = size of the class interval

f_1 = frequency of the modal class

f_0 = frequency of the class preceding the modal class

f_2 = frequency of the class succeeding the modal class.

iv) Standard Deviation

Standard Deviation is the square root of the mean of the squared deviation from the arithmetic mean. It measures the absolute dispersion, greater the standard deviation, greater will be the magnitude of the deviation of the values from their mean. A small standard deviation means a high degree of uniformity of the observation as well as homogeneity of a series. A large standard deviation means just the opposite. The standard deviation of a random variable X is defined as:

$$\sigma = \sqrt{E((X - E(X))^2)} = \sqrt{E(X^2)} - (E(X))^2$$
$$= \sqrt{Var(X)}$$

Where,

$E(X)$ is the expected variable of X $Var(X)$ is the variance of X.

v) Correlation

Correlation, in the finance and investment industries, is a statistic that measures the degree to which two securities move in relation to each other. Correlations are used in advanced portfolio management, computed as the correlation coefficient, which has a value that must fall between -1.0 and +1.0.

$$\gamma = \frac{\sum(x - \bar{x})(y - \bar{y})}{\sqrt{\sum(x - \bar{x})^2 J (y - \bar{y})^2}}$$

Where:

r = Correlation coefficient

$\overline{x}$ = Average of observations of variable X

$\overline{Y}$ = Average of observation of variable Y

vi)Skewness

The term "skewness" refers to the statistical metric that is used to measure the asymmetry of a probability distribution of random variables about its own mean, and its value can be positive, negative, or

undefined. The calculation of the skewness equation is done on the basis of the mean of the distribution, the number of variables, and the standard deviation of the distribution.

Mathematically, the skewness formula is represented as,

Skewness = $\sum N_i (X_i – X)3 / (N-1) * \sigma 3$

Where,

- X_i = i^{th} Random Variable
- X= Mean of the Distribution
- N = Number of Variables in the Distribution
- Ơ = Standard Distribution

vii) Kurtosis

The formula for kurtosis is expressed as the ratio of the fourth moment and variance (s^2) squared or squared the second moment of the distribution. Mathematically, it is represented as,

Kurtosis = $n * \Sigma n_i(Y_i – \bar{Y})4 / (\Sigma n_i(Y_i – \bar{Y})2)2$

Where

- **Y_i**: i^{th} Variable of the Distribution
- **$\bar{Y}$:** Mean of the Distribution
- **n** : No. of Variables in the Distribution

viii)Augmented Dickey-Fuller T Est

The Augmented Dickey-Fuller test allows for higher-order autoregressive processes by including $\Delta y_{t-p} \Delta y_{t-p}$ in the model. But our test is still if $\gamma=0$

$\gamma=0.\Delta y_t=\alpha+\beta t+\gamma y_{t-1}+\delta 1\Delta y_{t-1}+\delta 2\Delta y_{t-2}+\ldots \Delta y_t=\alpha+\beta t+\gamma y_{t-1}+\delta 1\Delta y_{t-1}+\delta 2\Delta y_{t-2}+\ldots$

The null hypothesis for both tests is that the data are non-stationary. We want to REJECT the null hypothesis for this test, so we want a p-value of less that 0.05 (or smaller).

Results of Descriptive Statistics for Board Indices of During the Period Of

1st January 2020 to 31st December 2020

	S&P BSE 100	S&P BSE 200	S&P BSE 250 LARGE MIDCAP	S&P BSE 500	S&P BSE ALL CAP
Mean	0.00056	0.000597	0.000595	0.000611	0.000625
Median	0.002439	0.002576	0.002592	0.002856	0.002813
Maximum	0.081427	0.078046	0.077017	0.074933	0.074546
Minimum	-0.13881	-0.13828	-0.1383	-0.13789	-0.13757

Std. Dev.	0.019644	0.019284	0.019191	0.019083	0.019014
Skewness	-1.85575	-1.97179	-2.01043	-2.07765	-2.09559
Kurtosis	15.97037	16.56755	16.76616	16.87598	16.93391
Jarque-Bera	1903.477	2087.799	2151.012	2185.513	2214.236
Probability	0.001	0.001	0.001	0.001	0.001
Sum	0.140553	0.149758	0.149431	0.152737	0.156896
Sum Sq. Dev.	0.096473	0.092971	0.092076	0.090674	0.090387
Observations	251	251	251	251	251

Source: Data collected from www.bseindia.com and computed using Eviews

Table 3.5 Shows the results of descriptive statistics for sample Board indices during the study period from 01-01-2016 to 31-12-2016. Summary statistics, namely, mean, minimum, maximum, median, standard deviation (SD), skewness, kurtosis and the Jarque- Bera were used to analyse the sample indices return during the study period.

It is clear from the Table that during the study period, the index of Board indices earned high mean value of (0.000625), followed by with a value of (0.000611). The mean returns of sample indices i.e. S&P BSE 100(0.00056) and S&P BSE 200 (0.000597), S&P BSE 250 Large Mid cap (0.000595), S&P BSE 500 (0.000611) and S&P BSE ALL_CAP (0.000625) during the study period. In terms of market unpredictability, as measured by the standard deviation of daily returns, China assumed the highest risk value (0.019644), followed by S&P BSE 100 (0.019644) ,S&P BSE 200(0.019284),S&P BSE 250 Large Mid cap (0.019191), S&P BSE 500 (0.019083), S&P BSE ALL_CAP (0.019014). This indicates the fact that there was high risk (in the order of indices, namely, S&P BSE 100, S&P BSE 200, S&P BSE 250 Large Mid cap ,S&P BSE 500, S&P BSE ALL_CAP). High degree of risk was useful for speculators but the investors may carefully study the market risk and carefully take investment decision of portfolio diversification.

The analysis of skewness shows that values for all sample indices, except S&P BSE 100 (-1.85575), S&P BSE 200 (-1.97179), S&P BSE 250 Large Mid cap (-2.01043), S&P BSE 500(-2.07765), were negative. It is significant to note from the Table that all sample indices of emerging Indian markets earned values of kurtosis larger than three. Besides, the Jarque-Bera (JB) values of the sample indices implied that all the sample indices were normally distributed.

(b) Correlation

Correlation analysis helps to determine the strength of the linear relationship between the two variables X and Y, in other words, as to how strongly are these two variables correlated. Karl Pearson, in 1896, developed an Index or Coefficient of this association in cases where the relationship is a linear one, i.e. where the trend of the relationship can be described by a straight line.

The Pearson's coefficient of correlation is designated by r. The coefficient of correlation r can be designed as a measure of strength of the linear relationship between the two variables X and Y.

The sign of the coefficient can be positive or negative. It is positive when the slope of the line is positive and it is negative when the slope of the line is negative.

The Coefficient of Correlation (r)

$$r = \frac{n(\sum XY) - (\sum X)(\sum Y)}{\sqrt{n\sum X^2 - (\sum X)^2}\sqrt{n\sum Y^2 - (\sum Y)^2}}$$

Results of Correlation for Board Indices During the Period from

1st January 2020 to 31st December 2020

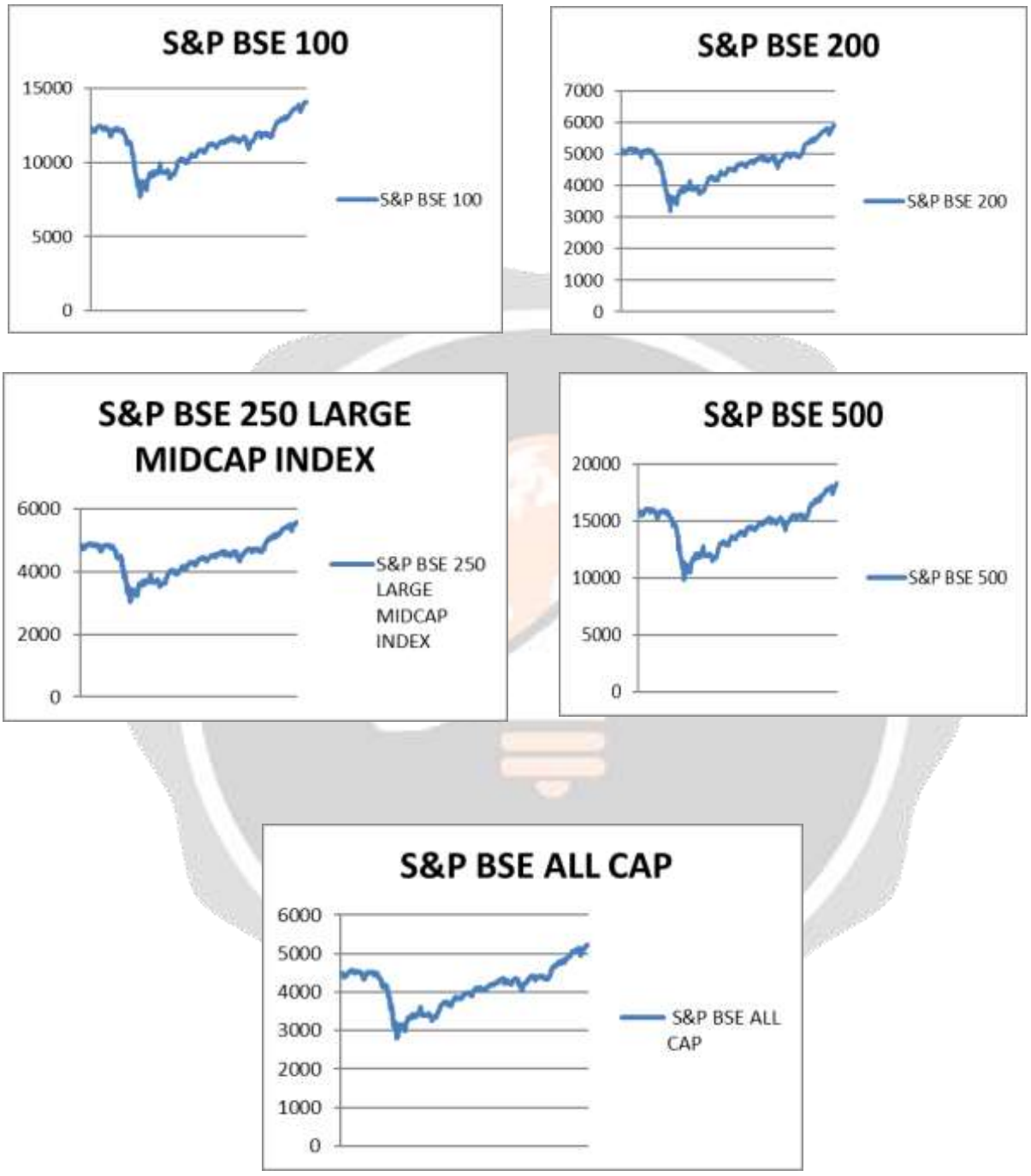
	S&P BSE 100	S&P BSE 200	S&P BSE 250 LARGE MIDCAP	S&P BSE 500	S&P BSE ALL CAP
S&P BSE 100	1				
S&P BSE 200	0.999774	1			
S&P BSE 250 LARGE MIDCAP	0.999727	0.999987	1		
S&P BSE 500	0.999463	0.999851	0.999909	1	
S&P BSE ALL CAP	0.999292	0.999791	0.999859	0.999979	1

Source: Data collected from www.bseindia.com and computed using Eviews

Table 3.10 shows the results of correlation among the sample Board indices in BSE. According to the results of the Table, the values of correlation ranged from (0.999774), S&P BSE 250 large midcap (0.999727), S&P BSE 500 (0.999463), S&P BSE ALL CAP (0.999292) were positive correlated.

Causal Relationship of Board Indices During the Period Of

1st January 2020 to 31st December 2020



Source: Data collected from www.bseindia.com and computed using MS Excel

Figure 3.5 shows the Causal Relationship of boardindices (S&P BSE 100, S&P BSE 200, S&P BSE 250Large Mid cap, S&P BSE 500, S&P BSE ALL_CAP) during the study period from 01st January 2020 to 31st December 2020. It is clear from the Figure that selected indices were fluctuating highly during the above period.

6. SUGGESTIONS

This found that there is a relationship between selected broad market indices during the study period. It is suggested that the investor need to analyse the linkages exist between the indices of stock market. This study suggested to consider the broad market indices in make the investment portfolio. The policy maker and market regulators should focus their vision towards the linkages and co-movement between the indices in capital market. The information about the performance of financial market supports the investors for the further portfolio construction.

7. CONCLUSION

Growth of an economy is very important and foremost for the development of country. One of the major forces of economic development is financial market. Hence, the policy makers and regulators of Indian capital markets should pay attention to the performance of the market. It supports to identify the return and movements of the stock market indices. It guides the investors to make better portfolio diversification for the betterment of their investment.

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