WEAK FORM OF MARKET EFFICIENCY: A STUDY ON BSE SENSEX & SENSEX 50

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ABSTRACT:

In this study attempt has made to test the weak form of market efficiency on the Indian stock market by taking data for BSE Sensex and BSE Sensex50. The BSE Sensex 50 was launched in December 2016, which did not permit us to take data for a longer period. The period of study covers a period of three years and six months ranging from January 2017 to 30 June 2020. Daily data has taken to study the weak form of efficiency of the two indices. Statistical tools such as Jarque-Bera Test, RUN test and ADF unit root test has used to derive the result for the efficiency of the two indices. The result shows that the two indices are not satisfying the weak form of market efficiency hypothesis during the study period.

Key words: Sensex, Weak form of efficiency, Indices, BSE

I. INTRODUCTION:

Now days the stock market is playing an important role for the companies to raise fund from the market. The stock exchange is providing the platform to the companies to buy and sell the listed securities. Due to the liquidity aspects of the stock exchange, the buyers and sellers can easily execute their orders, which help the companies. One can hear a number of terminologies in stock market like fundamental analysis, technical analysis, financial derivative, market efficiency, etc. Among the terms, stock market efficiency is one of the most debatable topics for the researcher. In efficient market, the share prices follow an independent path. The factors like large number of investors in the market, free flow of information to all the investors, investors are capable to interpret the information’s available in the market, etc creates a favorable condition for the market efficiency. In efficient market, the shares move independently and only one factor which is the demand and supply influence the price. Several regulatory changes in Indian stock market
like online trading system, depository system, introduction of derivatives, provision to check insider trading, etc has introduced to create market more efficient. Due to the importance of market efficiency, many researchers across the world are being interested to study the market efficiency of different stock exchanges. Indian researchers have also conducted much research about not only Indian stock market but also other stock exchanges of the world. Most of the researchers are doing their study in the benchmark indices, but in this study, we have tried to find out the efficiency of the benchmark index and the next to benchmark index of the leading stock exchange in India named BSE. The BSE Sensex is also known as S&P BSE Sensex, but more popularly it is known as Sensex. Sensex is calculated by taking the performance of top 30 companies of BSE. The companies are selected from various sectors those are actively traded largest companies. The Sensex 50, which is also known as S&P Sensex 50, measures the performance of the top 50 largest and liquid stocks.

The main objective of the study is to find out whether the data series is following random walk or not for the two indices. The importance of the study is that the level of efficiency of a market is not a stationary phenomena, it keeps on changing from time to time. Therefore, it is important to study the efficiency at regular intervals.

II. REVIEW OF LITERATURE:

Many researchers have conducted their study on weak form of market efficiency of different stock exchanges in the world. In his paper by Ranganathan and Subramanian was an attempt to test imperically the weak form of efficient markets hypothesis using the frequency domain approach of spectral analysis. The results of the analysis show that there are some periodic cycles in the price movements, which run, counter to the assertion of weak form of efficient market hypothesis.

In their paper titled “Stock Market Reaction and Liquidity Changes around Bonus Issue Announcement: Evidence from India” by (2007), Madhuri Malhotra, M. Thenmozhi, G Arun Kumar (2007), examines share price reaction to the announcement of bonus issue for a sample of Indian companies. Standard event study methodology has used for the purpose of study. The result of the study was there is a negative reaction after the bonus issue announcement conveying that the market under reacts after the announcement.
Based on an analysis of 70 companies listed in the “A” list category on the Bombay stock exchange, the paper by Belgaumi was an attempt to test the weak form of efficiency of the Indian stock market in Vikalpa (April-June, 1995). By subjecting the weekly share prices to Serial Correlation Analysis and Run test, Belgaumi finds that the Indian stock exchanges are efficient in the weak form and that the independent assumption regarding the movement of share prices over short period holds good.

By taking daily data for period 1991 to 2006, Basu and Gupta in 2007 tried to find out the weak form of efficiency test for Bombay stock exchange and National stock exchange of India. They have used unit root tests named ADF, PP and KPSS for their study purpose and found that Bombay Stock exchange and National Stock exchange are not following weak form of efficiency. By taking the daily price quotation of 93 actively traded shares for the period January 1988 to April 1990, S.K. Chaudhuri attempts to examine the serial independence of the share price changes. He had applied the serial correlation and run test to daily log price changes. The result of their study did not support the hypothesis of weak form of market efficiency. Barua and Raghunathan argued in his paper in Vikalpa, July to September 1986 that the Indian capital market was inefficient based on an illustration.


In paper titled “Quasi-Maximum Likelihood Estimation and Inference in Dynamic Models with Time Varying Covariance” Brock, Lakonishok and LeBaron (1992) tested 26 simple technical trading rules on daily data of the Dow-Jones Industrial Average for the period 1897-1986. They conclude that buy signals generates higher returns during buy days compare to sell signals during sell signals.

A study was conducted by Awad and Dara-ghma on Palestinian stock exchange in the year 2009 by using ADF test, Phillips – Perron test, unit root test, serial correlation and run test. In the result, they found that there was an absence of weak form of efficiency in the Palestinian stock exchange. In the study of El-Erian and Kumar in the year 1995 by using the run test and serial
correlations test on the stock markets of Turkey and Jordan found the absence of weak form efficiency.

In their paper testing random walk hypothesis for Indian stock market indices, Bhanu Pant and Dr T.R. Bishnoi have analyzed the behavior of daily and weekly returns of five Indian stock market indices for random walk for the period April-1996 to June-2001. They tested the indices for normality, autocorrelation using Q-statistic & Dickey-Fuller test and analyzed variance ratio test. The results support that Indian stock market indices do not follow random walk.

III. METHODOLOGY:

All the data for the study has collected from the secondary sources, from the website of BSE and no primary data has used in this study. The period of the study is three years and six months ranging from 2 January 2017 to 30 June 2020 of Sensex and Sensex50. The daily closing prices of the indices are collected for the study purpose.

For the evaluation of the study, the following test will be applied.

For the test of normality, Jarque-Bera Test will be applied.

For the test of stationarity, ADF unit root test will be done

For test of the weak form of efficiency Run test will be applied.

For the study purpose, the SPSS and Eviews software has been used for calculation purpose. The ADF and descriptive statistics tests have done by using Eviews 8 software and for Run test purpose, SPSS 20 is used.

IV. DATA ANALYSIS

A) UNIT ROOT TEST

Unit root test is conducted to measure whether the time series is stationary or not. In this study to test the existence of the unit root, we have applied the ADF (Augmented Dicky Fuller) test. with the null hypothesis that data has a unit root. Before doing the run test and other tests for the test of weak form of efficiency of the indices, the data series have to be tested for the existence of unit root. The existence of the unit root indicates that the data is not stationary. This means that the test statistics will yield different results for different period, which is not desirable.

The table 1 shows the result of the ADF test. The p-value of the first test of the original data at level was greater than 0.05 for both the indices, so we accept the null hypothesis that the data has
unit root, so the data is not stationary. Therefore, the data was converted to its first difference and ADF test was done again. The ADF test results of the first difference data was found to be stationary by rejecting the null hypothesis, as the p-value is 0.00 for both the indices that is less than 0.05. It is clear from the table 1 is that the data series is stationary in first difference.

<table>
<thead>
<tr>
<th>Index</th>
<th>Level t-statistics</th>
<th>Level Prob.</th>
<th>1st difference t-statistics</th>
<th>1st difference Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SENSEX</td>
<td>-2.464229</td>
<td>0.1247</td>
<td>-11.47976</td>
<td>0.0000</td>
</tr>
<tr>
<td>SENSEX 50</td>
<td>-2.681767</td>
<td>0.0776</td>
<td>-9.820101</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Source: Authors own calculations

B) DESCRIPTIVE STATISTICS:

The overall description of the all the common statistical parameters of all the data series has represented in the table-4.

In this study to test the normality of the data series, we have used Jarque-Bera test. Jarque-Bera test is conducted to check whether sample data have the skewness and kurtosis matching a normal distribution or not. The test statistic is always non-negative and if it is far from zero, it signals that the data do not have a normal distribution. The test is conducted by taking the null hypothesis that the data follow normal distribution.

As reflected in the table 2 all, the series have high degree of standard deviation. The skewness of all the series is non-zero, which indicates that the series is not normally distributed. Kurtosis of the two indices is less than three. These facts are also supported by the fact, that the Jarque-Bera test also gives the similar type of result with p value of 0.000 for all the data series by rejecting the null hypothesis. This indicated that the result of two data series are not normally distributed, and does not fulfill the pre condition of random walk.
**TABLE -2**

<table>
<thead>
<tr>
<th></th>
<th>SENSEX</th>
<th>SENSEX50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>34947.08</td>
<td>11012.35</td>
</tr>
<tr>
<td>Median</td>
<td>35159.46</td>
<td>11117.38</td>
</tr>
<tr>
<td>Maximum</td>
<td>41952.63</td>
<td>12956.27</td>
</tr>
<tr>
<td>Minimum</td>
<td>25981.24</td>
<td>7961.260</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>3680.506</td>
<td>1062.870</td>
</tr>
<tr>
<td>Skewness</td>
<td>-0.130364</td>
<td>-0.357113</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>2.254902</td>
<td>2.481721</td>
</tr>
<tr>
<td>Jarque-Bera</td>
<td>22.38150</td>
<td>27.96939</td>
</tr>
<tr>
<td>Probability</td>
<td>0.000014</td>
<td>0.000001</td>
</tr>
<tr>
<td>Sum</td>
<td>30124385</td>
<td>9492642.</td>
</tr>
<tr>
<td>Sum Sq. Dev.</td>
<td>1.17E+10</td>
<td>9.73E+08</td>
</tr>
</tbody>
</table>

Source: Authors own calculations

**C) RUN Test:**

The Wald–Wolfowitz runs test, simply Run test is a nonparametric test used to check whether the return series runs randomly or not. The run test only considers the movements regarding signs like positive sign and negative sign in a time series ignoring the value in the absolute form. In Run test, the number of observed runs is compared with the number of expected runs. The run test has done to test the weak form of efficiency of the market by considering the null hypothesis that the indices follow random walk. When the positive returns changes to negative return then one-run changes and vice versa. Then we have to count the number of runs to apply the run test. As the sample size of this data set is very large so the help of the SPSS software has been taken for conducting the run test.

The results of the test have been shown in table 3. The table -3reveals that the test statistics Z for run test for all data series is negative which indicate that actual number of runs is smaller significant than the expected number of runs. From the results of the run test for the completely period study of the indices shows that the p-values of Sensex and sensex50 are less than 0.05.
This indicates that we can reject the null hypothesis that the data series follows random walk and accept the alternate hypothesis that the data series does not follow the random walk in case of the two indices. Therefore, we cannot say that the Sensex and Sensex50 are efficient in weak form.

**TABLE 3**

<table>
<thead>
<tr>
<th>Runs Test</th>
<th>SENSEX</th>
<th>SENSEX50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Value</td>
<td>35159.46</td>
<td>11117.38</td>
</tr>
<tr>
<td>Cases &lt; Test Value</td>
<td>431</td>
<td>431</td>
</tr>
<tr>
<td>Cases &gt;= Test Value</td>
<td>431</td>
<td>431</td>
</tr>
<tr>
<td>Total Cases</td>
<td>862</td>
<td>862</td>
</tr>
<tr>
<td>Number of Runs</td>
<td>29</td>
<td>23</td>
</tr>
<tr>
<td>Z</td>
<td>-27.468</td>
<td>-27.877</td>
</tr>
<tr>
<td>Asymp. Sig. (2-tailed)</td>
<td>.000</td>
<td>.000</td>
</tr>
</tbody>
</table>

Source: Authors own calculations

V. CONCLUSIONS:

From the above study, we found that both the indices are not stationary a level but they are stationary in first difference. The whole period data of two indices does not follow the random walk from RUN test. The two data series are not normally distributed and is not fulfill the pre condition of random walk for descriptive statistics. Therefore, the result of the run test leads to conclusion that the market is not efficient. We may conclude that the two selected indices of BSE do not full fill the conditions of the weak form of marker hypothesis during the period of the study. We may say that the stock market does not reflect all the information related to the share. The price in the market is not only because of the fundamental factors associated with the
stock but there are also other factors, which affects the share prices in the market. We can also suggest the investors that while investing in stock market do not depend only on the price behavior of the stock, the investors should also consider all other company and industry related factors while taking any investment decision.

**REFERENCE:**


