Testing weak Form of Capital Market Efficiency: An Empirical Evidence from BSE and NSE

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ABSTRACT

The rapid development of financial market gains the attention of investors towards stock market investment worldwide. The stock market possesses the inherent feature of volatility because the world is uncertain and unpredictable. For understanding the stock market behaviour it is important to know about market efficiency. The testing of market efficiency assists the all stakeholders in learning the key aspects of market movement. Efficient market hypothesis (EMH) is the core of finance. Many advanced studies emphasized that stock market efficiency play a vital role in providing the true information to traders and reflects fair value on the current market price. The present study aims to analyse the efficiency of Indian stock market by taking weak form of market efficiency. The study evaluates the efficiency of Sensex (Benchmark of BSE) and Nifty (Benchmark of NSE). The efficiency is tested by taking closing values of indices from 31-03-2019 to 31-03-2020. For analysis the statistical tools auto correlation and serial correlation test were used. The results obtained from the study revealed that market is not efficient and is not independent in both the market.

Keywords

EMH, Sensex, Nifty, Stock market

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Introduction

When successive stock price changes and price movements are independent, it indicates that the stock market is weak-form efficient (Fama, 1970). Thus, the randomness of stock returns which is the basis of the Random Walk (RW) theory should be examined in order to investigate weak-form market efficiency. We call if the random walk theory in such a market any sort of analysis (fundamental or technical). Though it has been empirically found that no market are efficient in the any form, yet it is found that different market the world over exhibit different level of efficiency, as a market become more diversified portfolio itself. Market portfolio as we know it theoretically defined to be a portfolio consisting of all the stock with weight being proportional to their market capitalization. Such a market portfolio doesn't exist .we instead consider a well-developed stock market index such as the Sensex or Nifty in India, Dow Jones Industrial average in US as a proxy for the market portfolio. A market is said to be weakly efficient if it is not possible to make super normal profit with certainty, with the help of information embedded in past prices. In other words the current stock prices discounts all information embedded in past prices, thus technical analysts would be abundant in such a market.

Review of Literature

Angelovska (2018), The study examined the efficient market hypothesis in its weak form in the context of the emerging Macedonian stock market. For the purpose of study sample was taken from 4th January 2005 to 2nd April 2018. The study applied most popular econometric techniques of ADF unit root test and GARCH model for estimating the evidence. The results revealed that the Macedonian Stock Market is not weak form efficient providing conditions for profitable trading.

Patel et.al.(2018) The study was undertaken to find out the Testing weak form of market efficiency through which future market can be predicted by using past data. The study was conducted by taking three years daily closing points of sensex. The period for which data were taken commencing from 1st April 2015 to 31st March 2018. For analyzing the data Run test was

applied. The results of study conclude that market can be outperformed and thus violates random walk theory which denotes market is not efficient.

Parulekar (2017), The study analyzed the weak from of market efficiency by taking into consideration five companies from diversified sectors which include Infosys Limited, Hindustan Unilever Limited, Larsen & Toubro Limited, Mahindra and Mahindra Limited and Sun Pharmaceutical Industries Limited. For testing the efficiency monthly data are taken from 1st April 2004 to 31st March 2016. The statistical tools which are used in study are s "Runs Test" and "Autocorrelations. The study revealed that stock price movement is not random in extreme short term particularly for companies like Larsen & Toubro Limited and Mahindra and Mahindra Limited. These companies reflect more volatile sectors such as Capital goods and Automobiles as against sectors such as FMCG, IT and Pharma.

Gupta (2014) for the purpose of determining whether Indian Stock Market are Efficient or not the study was carried out. For the purpose of study daily closing points of BSE 100 were taken from January 2003 to December 2012. For finding out the efficiency various statistical tools were applied such as Unit Root test, Runs test and Kolmogorov–Smirnov test (K–S test) with the help of software Eviews5. The results of study revealed that Indian stock market does not move randomly it means there is dependency of current security prices on the past.

Khan et.al. (2011) The study analyzed the market efficiency of Indian Capital Market in its weak form based on the stock exchanges of India viz; National Stock Exchange (NSE) and Bombay Stock Exchange (BSE). For testing the efficiency daily closing values of the indices of NSE and BSE over the period of 1st April 2000 to 31st March 2010 were taken. The statistical tools which are employed is Runs Test. Based on the result of runs test alternate hypothesis is rejected and it is proved that Indian Capital market neither follow random walk model nor is a weak form efficient.

Research Gap: - After reviewing all literature it is found that market efficiency is the important aspect for research. Many of the studies have been conducted so far in India as well as outside India. The present study focuses on the period where no study has been conducted keeping both the stock market prices BSE and NSE. Therefore, this study will be a value addition in the present scenario and will assist the all stakeholders.

Statement of Problem

The study is an attempt to check the movement of Sensex and Nifty whether they reflect past information which are efficient or not the period of study commence from 31-03-2019 to 31-03-2020. The closing value of Sensex and Nifty were taken. The study entails a big issues like political, social and natural which has direct and indirect impact on Indian Stock market as we are surviving in globalized era.

Research Methodology

4.1 Objectives of the study: -

- To examine whether price change in Indian capital Market (BSE Sensex) are independent or not. (Is not efficient)

- To examine whether price change in Indian capital market NSE Nifty are independent or not.

4.2 Hypotheses

- **Ho1:-** Change in Indian capital Market (BSE Sensex) are Independent.
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Ho2:- Change in price change in Indian capital market NSE Nifty are independent

4.3Sample Design

i. **Population: -** The stock prices of Indian Stock Market BSE and NSE.

ii. **Sample Technique**: - The study aims to find out the behavior of market (BSE and NSE) therefore convenient sampling was used for selecting the period of study. The prices of one year were taken into consideration for identifying the market movement.

1. **Data Collection: - For collection of data secondary source was used.** The data used in the study consists of daily closing price of BSE and NSE commencing from ……to…… Data were taken from yahoo finance.

2. **Tools for Analysis: -** For testing the behavior Auto efficiency test and Serial correlation test was applied.
- **Auto Correlation Test**: -This test is intended to check whether the price change in two deferent period are independent or not. The test recommend that market would be weakly efficient if the price change are independent and there is no correlation i.e. r=0.
- **Serial Correlation Test**: This is similar to the auto correlation, this test is also intended to check whether the percentage change in price in two deferent periods is independent or not.

3. **Data Analysis: - Data were by using auto correlation and serial correlation tests. Hypothesis: - Ho1**:- For testing Ho1:- Following tables are referred

Table-1

Date	Adj Close prices	Date	Adj Close prices
02/01/2018	34184.03906	02/01/2019	35867.44141
03/01/2018	32968.67969	03/01/2019	38672.91016
04/01/2018	35160.35938	04/01/2019	39031.55078
05/01/2018	35322.37891	05/01/2019	39714.19922
06/01/2018	35423.48047	06/01/2019	39394.64063
07/01/2018	37606.57813	07/01/2019	37481.12109
08/01/2018	38645.07031	08/01/2019	37332.78906
09/01/2018	36227.14063	09/01/2019	38667.32813
10/01/2018	34442.05078	10/01/2019	40129.05078
11/01/2018	36194.30078	11/01/2019	40793.80859
12/01/2018	36068.32813	12/01/2019	41253.73828
01/01/2019	36256.69141	01/01/2020	40723.48828

Source: Yahoo Finance

Table -2

Change in price of period 1(X)	Change in price of period -2(Y)	X^2	Y^2	XY
-1215.35	2805.4	-3409542.89	7870269.16	-3409542.8
2191.67	358.64	786020.5288	128622.6496	786020.52
162.01	682.64	110594.5064	465997.3696	110594.50
101.10	-319.55	-32306.505	102112.2025	-32306.505
2183.0	-1913.5	-4177170.5	3661482.25	-4177170.5
1038.49	-148.3	-154008.067	21992.89	-154008.06
-2417.9	1334.5	-3226687.55	1780890.25	-3226687.5
-1785.08	1461.7	-2609251.436	2136566.89	-2609251.4
1752.25	664.75	1164808.188	441892.5625	1164808.1
-125.97	459.9	-57933.603	211508.01	-57933.603
188.36	-530.2	-99868.472	281112.04	-99868.472

Source: Author

r^2 = a $\Sigma Y + b\,\Sigma YX - n(Y$

Y^{-}

Data analysis and Interpretation

Table -1 shows the closing price of BSE Sensex in two different period first period starts from from 02/02/2018 to 01/01/2019 and second period from 02/01/2019 to 01/01/2020.

Table -2 shows the price change from period one to second.

Similarly table-3 showing the percentage change in price for deferent period i.e. from 02/01/2018 to 01/01/2019, be considered as the period one. While 02/01/2019 to 01/01/2020 is considered as period -2. In the bottom of the table we are able to quantifying the value of correlation coefficient (r) for both the table.

The results derived from above calculations indicates the correlation between two periods. After calculating correlation coefficient (r) it is r=.-.6671. As the concept suggests negative correlation means both the prices are not moving in same direction. It reflects that market is not efficient in weak form as prices are depended on each other. The percentage change in price of two different period of BSE Sensex is moderately dependent on each other.

The above table is helpful for the calculation of correlation with help of using Excel. We get r =-.6671. As we know that correlation coefficient (r) lies between +1 to -1. +1 showing the perfectly positive correlation between the any two variable. -1 value showing the correlation relationship of the two variable are perfectly negatively correlated, means both variables are working against to each other. In this case value of correlation coefficient is -.6671 which neither perfectly negative nor **independent (r≠0).** The results of study revealed that market in not efficient in weak form.

Auto correlation test: -0.667115921

Table -3

Date	% Age Change in price of period 1(X)	Date	% Age Change in price of period -2(Y)
03/01/2018	-3.56%	03/01/2019	7.82%
04/01/2018	6.65%	04/01/2019	0.93%
05/01/2018	0.46%	05/01/2019	1.75%
06/01/2018	0.29%	06/01/2019	-0.80%
07/01/2018	6.16%	07/01/2019	-4.86%
08/01/2018	2.76%	08/01/2019	-0.40%
09/01/2018	-6.26%	09/01/2019	3.57%
10/01/2018	-4.93%	10/01/2019	3.78%
11/01/2018	5.09%	11/01/2019	1.66%
12/01/2018	-125.972656	12/01/2019	459.929687
01/01/2019	188.363281	01/01/2020	-530.25

Source: Author (**Serial correlation test: - -0.664987649 ((r≠0)**

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Hypothesis: - Ho2:- For testing Ho2 following tables are referred.

Table -4

Date	Adj Close prices	Date	Adj Close price
02/01/2018	10492.84961	02/01/2019	10792.5
03/01/2018	10113.7002	03/01/2019	11623.90039
04/01/2018	10739.34961	04/01/2019	11748.15039
05/01/2018	10736.15039	05/01/2019	11922.79981
06/01/2018	10714.29981	06/01/2019	11788.84961
07/01/2018	11356.5	07/01/2019	11118
08/01/2018	11680.5	08/01/2019	11023.25
09/01/2018	10930.4502	09/01/2019	11474.4502
10/01/2018	10386.59961	10/01/2019	11877.4502
11/01/2018	10876.75	11/01/2019	12056.04981
12/01/2018	10862.54981	12/01/2019	12168.4502
01/01/2019	10830.9502	01/01/2020	11962.09961

Source: Yahoo Finance

Table -5

Date	Change in price of NSE Nifty from 02/01/201	Date	Change in price of NSE Nifty from 02/01/2019-01/01/2020
03/01/2018	-379.149	03/01/2019	831.4004
04/01/2018	625.6494	04/01/2019	124.25
05/01/2018	-3.19922	05/01/2019	174.6494
06/01/2018	-21.8506	06/01/2019	-133.95
07/01/2018	642.2002	07/01/2019	-670.85
08/01/2018	324	08/01/2019	-94.75
09/01/2018	-750.05	09/01/2019	451.2002
10/01/2018	-543.851	10/01/2019	403
11/01/2018	490.1504	11/01/2019	178.5996
12/01/2018	-14.2002	12/01/2019	112.4004
01/01/2019	-31.5996	01/01/2020	-206.351

Source:Author

(**Autocorrelation test: - -0.658766272)**

From table -4 to table-6 all explanation about the NSE NIFTY. Table -4 given the price of nifty index from 02/01/2018 to 01/01/2020 which are divided again in to two period first period considered from 02/01/2018 to 01/01/2019. While the second period is considered from 02/01/2019 to 01/01/2020.By considering a time lag of 12 month study aims to find out the auto correlation test and serial correlation test to measure the weak form of market efficiency

By using the data from table-5 to table -6 we are able to measure independency of price change in two deferent period of time, which are explained by correlation coefficient ($r \neq 0$). Since the value or r is -0.6587 which is not equal to zero which indicates market is not efficient in weak form. It means that price of market is moving randomly during this period.

Table -6

Date	Percentage change of price period -1	Date	Percentage change in price for period -2
02/01/2018		02/01/2019	
03/01/2018	-3.61%	03/01/2019	7.70%
04/01/2018	6.19%	04/01/2019	1.07%
05/01/2018	-0.03%	05/01/2019	1.49%
06/01/2018	-0.20%	06/01/2019	-1.12%
07/01/2018	5.99%	07/01/2019	-5.69%
08/01/2018	2.85%	08/01/2019	-0.85%
09/01/2018	-6.42%	09/01/2019	4.09%
10/01/2018	-4.98%	10/01/2019	3.51%
11/01/2018	4.72%	11/01/2019	1.50%
12/01/2018	-0.13%	12/01/2019	0.93%
01/01/2019	-0.29%	01/01/2020	-1.70%

Source: Author (Serial correlation test: -0.65866275)

Market is not efficient in weak form since the serial correlation i.e. percentage change in price during this period is moderately negatively depends on each other.

Findings and Conclusion:

The findings of study revealed that there is negative correlation (-.667) between sensex prices for one period and second period of study which denoted both the prices are not moving in same

direction. The results of study revealed that market in not efficient in weak form. Similarly for Nifty prices r is -0.6587 which is not equal to zero which indicates market is not efficient in weak form. It means that price of market is moving randomly during this period.

In this study it states that the successive absolute price changes are not independent in short run and subject to assumption that the market comprises rational investors. However investors are not always rational so they consider factors other than risk and return for selecting security. It is extremely difficult, if not impossible, to segregate the fractional influence of these factors. In the Indian stock market, sentiments play a major role in price behavior at the counters.

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