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WEAK FORM EFFICIENCY OF INDIA STOCK MARKET WITH REFERENCE TO BSE

RAVI KUMAR GUPTA

Professor, Vaish College of Engineering, Rohtak, Haryana, India

ABSTRACT

There is always a doubt in the mind of an investor whether the stock market where he is going to invest is an efficient market or not. Investor's profit from the market depends upon this. The present study was an attempt to look at the efficiency of Indian stock market. BSE index, SENSEX was used in the study to represent the Indian stock market. The daily closing points were taken for the sample period of ten years from January 2003 to December 2012. The data was collected from the official website of Bombay Stock Exchange i.e. www.bseindia.com. Different statistical tools like Unit Root test, Runs test and Kolmogorov–Smirnov test (K–S test) were used to analyze the data with the help of software Eviews5. The study concluded that Indian stock market was not showing any sign of weak form efficiency which means information of the past are not completely absorbed in the current prices. The study concluded that an investor has the opportunity to make an estimate of current prices on the basis of past information.

KEYWORDS: BSE, SENSEX, Weak form Efficiency, Indian Stock Market

INTRODUCTION

Market efficiency is very important for any stock market because investment decisions of an investor are very much influenced by this. An investor can earn abnormal profits by taking benefit out of inefficient market whereas there is no scope of earning extra profits in an efficient market. The random walk hypothesis states that future prices are not predictable form the past. Successive price changes are not dependent over the past periods and past trends are not followed in future exactly. There is no information available in the market which is not reflected in the stock prices. Random walk basically means that prices vary randomly and there is not any significant pattern which followed in the market. The present study is an attempt to study the efficiency in Indian stock market.

LITERATURE REVIEW

Poshakwale (1996) believed that stock market efficiency is an important concept, for understanding the working of the capital markets particularly in emerging stock market such as India. They provided evidence of day of the week effect and that the stock market was not weak form efficient. **Azarmi et al. (2005)** suggested that stock market development in India is not associated with economic growth over a twenty-one year study period. **Gupta and Basu (2007)** tested the weak form efficiency in the framework of random walk hypothesis for the two major equity markets in India for the period 1991 to 2006. They suggested that the series do not follow random walk and there was an evidence of autocorrelation in both markets rejecting the weak form efficiency hypothesis. **Sehgal and Gupta (2007)** discussed that technical indicators do not outperform Simple Buy and Hold strategy on net return basis for individual stocks.

They suggested that technical analysis provides statistically significant returns for all the nine technical indicator on gross return basis. **Srinivasan (2010)** examine the random walk hypothesis to determine the validity of weak-form efficiency for two major stock markets in India. They suggested that the Indian stock markets do not show characteristics of random walk and were not efficient in the weak form implying that stock prices remain predictable. **Singh and Suri (2010)** tested the Indian stock market for weak form efficiency. The study showed that Indian stock markets were weak form efficient and price changes followed a random walk. **Khan et al. (2011)** proposed that testing the efficiency of the market is an important concept for the investors, stock brokers, financial institutions, government etc. and it was proved that Indian Capital market neither follow random walk model nor is a weak form efficient**.**

Aggarwal (2012) emphasized that Indian markets were random and successive index value changes were independent. The past index changes do not help the investor or analyst to forecast the future. **Rehman et al. (2012)** explained that how they tested the weak-form efficiency of emerging south Asian stock markets. While the Colombo Stock market was weak form efficient and reacted immediately to all publicly available information rather than past prices. Pakistani and Indian stock markets were emerging market so normally these markets follow rumors.

RESEARCH METHODOLOGY

The study explored the various studies relating to the efficiency of Indian stock markets. Accordingly the following objective of the study was developed:

To analyze the Weak form efficiency of Indian Stock market by taking sample of SENSEX of Bombay Stock Exchange. The data used in this study consisted of the daily closing points of SENSEX for the period of ten years from January 2003 to December 2012 compiled from the official website of Bombay Stock Exchange i.e. www.bseindia.com. With this data set, we computed the daily returns as follows:

$$R\_t = (In\ P\_t - In\ P\_(t-1)\ ) * 100$$

Where Rt is the return in period t, Pt and Pt-1 are the daily closing prices of the SENSEX at time t and t-1 respectively. **Augmented Dickey-Fuller and Phillips-Perron (PP)** was applied to test the null hypothesis of a unit root. The **Unit Root Test** is a necessary condition to check the stationarity of the data set used in the study. The results of ADF and PP test for a unit root for were presented in Data Analysis section.

Run test is a non-parametric test. A run is defined as a sequence of price changes of same sign, preceded or followed by price changes of different signs. Under the hypothesis that the successive price changes are independent and the sample proportions of positive, negative and no change runs are unbiased estimates of the population proportions, the expected number of runs can be computed by using the following formula proposed by Wallis and Roberts (1956).

$$M = \frac{N(N+1)-\sum_i^3 n_i^2}{N}$$

Where, M= Expected number of runs, n_i = Number of price changes of each sign (i=1, 2, 3) and N = Total number of price changes.

In statistics, the **Kolmogorov–Smirnov test (K–S test)** is a nonparametric test for the equality of continuous, one dimensional probability distributions that can be used to compare a sample with reference probability distribution (one-sample K–S test or to compare two samples (two-sample K–S test).

The empirical distribution function F_n for n iid observations, X_i is defined as

$$\boldsymbol{F_n\,(x) = \frac{1}{n}\sum_{i=1}^{n} I_{X_i} \leq x}$$

where $I_{X_i} \leq \boldsymbol{x}$ is the indicator function, equal to 1 if $I_{X_i} \leq \boldsymbol{x}$ and equal to 0 otherwise.

DATA ANALYSIS AND INTERPRETATION

Descriptive Statistics of Daily Returns

A summary of descriptive statistics for returns series of SENSEX of Bombay Stock Exchange for the sample period of ten years from January 2003 to December 2012 are presented in Table 1. This includes mean, maximum, minimum value, standard deviation, skewness, kurtosis and jarque-bera test.

Table 1: Descriptive Statistics of Daily Returns of SENSEX (January 2003 to December 2012)

Variables	Sensex
Mean	0.0712
Median	0.1246
Maximum	15.99
Minimum	-11.809
Std. Dev.	1.6381
Skewness	-0.0784
Kurtosis	10.8224
Jarque-Bera	6328.1

The highest average daily return was shown by SENSEX which has the return of .0712%. As far as volatility is concerned the standard deviation of SENSEX was at 1.638%. The coefficients of the skewness were found to be significant and negative for all the returns. Similarly, the coefficients of kurtosis were found to be positive and are significantly higher than 3, indicating highly leptokurtic distribution compared to the normal distribution for all the returns. The jarque- bera test was applied to know whether the return series was normally distributed or not. The null hypothesis is that the series is normally distributed. The above Table 1 showed that the p-value (0.0000) was less than .01 at 1% significance level so null hypothesis was rejected and hence the return series of SENSEX was not normally distributed.

Analysis of Unit Root Test

The results of ADF test for a unit root for SENSEX of Bombay Stock Exchange were presented in Table 2.

The above Table 2 showed that the p-value for the market under study for the entire sample period of ten years was significant at 1% level, so null hypothesis that series has a unit root problem was rejected.

Table 2: Unit Root Test of SENSEX (January 2003 to December 2012)

Variable	Sensex
ADF test	-46.319
p- value	0.0001*

*Indicates significance at 1% level of significance.

It means the series was stationary and therefore it can be concluded that this market do not have random walk and were not weak form of efficient.

Analysis of Kolmogorov-Smirnov Test

The results of the Kolmogorov-Smirnov Test of return series of the SENSEX of Bombay Stock are presented in Table 3.

Table 3: Kolmogorov-Smirnov Test for SENSEX (January 2003 to December 2012)

Variable	Sensex
Absolute	0.07
Positive	0.067
Negative	-0.07
K-S-Z	3.466
P-Value	0.000*

*Indicates significant at 1% level.

K-S test null hypothesis is that the return series is normally distributed. K-S stat was significant at 1% level which means null hypothesis was rejected. It can be concluded that the market under study do not follow normal distribution.

Analysis of Runs Test

The results of Runs Test for returns series of SENSEX of Bombay Stock Exchange for the entire are presented in Table 4.

Table 4: Runs Test of Daily Returns of SENSEX (January 2003 to December 2012)

Variables	Sensex
K=Mean	0.0007
Cases < K	1187
Cases >= K	1294
Total Cases	2481
Number of Runs	1175
Z- Statistic	-2.583
p-value	0.01*

*Indicates 1% level of significance.

A negative Z value indicated a positive serial correlation, whereas a positive Z value indicated negative serial correlation. The positive serial correlation implied that there was a positive dependence of stock prices, therefore indicating a violation of random walk. The above table showed that p-value was lesser than .01 at 1% significant level and lesser than .05 at 5% significant level. The p-value of SENSEX was 0.01, so null hypothesis that further price changes were not dependent and moved randomly, was rejected. It means price changes were dependent and random walk was not followed so SENSEX was not weak form efficient which means all past prices of a stock were reflected in current stock price. Therefore, investors looking for profitable companies can get profits by making an estimate of past trends.

CONCLUSIONS

In the present study, the predictability of returns of Indian stock market was analyzed. To test SENSEX of Bombay Stock Exchange was taken for the sample period of ten years from January 2003 to December 2012. Various statistical tools were used like Unit Root Test, Runs test, Kolmogorov-Smirnov Test to see how informationaly efficient Indian stock markets were. The results showed that the series was stationary and therefore it can be concluded that

Indian stock market did not show evidence of random walk which means that the information regarding yesterday's indices are not effectively absorbed by today's indices. This indicates presence of episodic dependencies in stock returns surrounded by long periods of pure noise. In other words, the Indian stock markets are not weak form efficient.

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