Testing Random Walk Hypothesis in Indian Stock Market – A Study of Selected Stocks Listed on BSE

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Abstract

Stock market efficiency is one of the most debatable issues in the economics literature around the world due to its importance in financial market and difficulties in measurement. Efficient Market Hypothesis (EMH) plays a crucial role in pricing and allocation of capital. No investor in an efficient market will be able to earn abnormal profits as there is no scope for 'under valuation' or 'over valuation' of prices of securities. In the past two decades, the areas of EMH have gained more importance, especially in the emerging markets like India. The movement of the stock market provides an insight to investors who buy and sell shares and securities with the aim of making profits. The results of the present study may be used by the institutions such as banks, stock exchange participants, non-financial institutions, foreign banks and insurance companies. The top thirty companies traded at the Bombay Stock Exchange have been considered for the study. Runs test was used for data analysis and interpretation. The result shows that the price movements in share prices of BSE are random in behavior implying that one cannot use the historical prices of shares for predicting their future prices. It was proved that the weak form of market efficiency or the random walk theory is applicable in the BSE.

INTRODUCTION

The long term lending and borrowing of funds in any economy is the major function of a capital market. The efficiency of capital market is decided based upon security prices which are assumed to reflect all relevant information. Stock market efficiency is one of the most debatable issues in the economics literature around the world due to its importance in financial market and difficulties in measurement. Efficient Market Hypothesis (EMH) plays a crucial role in pricing and allocation of capital. The term efficiency in finance market operation is used to describe a market in which relevant information is impounded into the price of financial instruments. An efficient market is defined as a market where there are large numbers of rational investors engaged in profit maximizing and actively competing with each other trying to predict future market values of individual securities, and where important current information is almost freely available to all participants.

Fama (1970) has been the first to develop the efficient market hypothesis (EMH). He formalized the EMH theory based on empirical evidences. He defines a market as being efficient if prices fully reflect all available information and suggest three models for testing efficiency: the Fair Game Model, the Sub martingale Model and the Random Walk Model. Fama (1970) categorized the EMH into three levels based on the definition of the available information set, namely, weak form, semi strong form and strong form. According to Fama (1970), the EMH supposes that share prices adjust rapidly to the appearance of

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new information. In efficient capital market, the security prices are assumed to quickly absorb all relevant information and reflect the same in its security prices. This implies that, no investor in an efficient market will be able to earn abnormal profits as there is no scope for 'under valuation' or 'over valuation' of prices of securities. Fama (1971) also argued that markets could be efficient at three levels, based upon what information was reflected in prices. As said earlier, the three popular forms of EMH are weak form EMH, semi strong form EMH and strong form EMH.

WEAK FORM EFFICIENT MARKET HYPOTHESIS

The weak form EMH assumes that the information relating to past price as well as volume of trading are reflected in the current price of the security. If the weak form EMH is true, it is a direct repudiation of technical analysis. That is, if a market is weak form efficient, technical analysis will be of no use.

EMI-STRONG FORM EFFICIENT MARKET HYPOTHESIS

The semi-strong form EMH assumes that all publicly available information is absorbed and reflected in the price of a security. The publicly available information means those information available through the corporate reports, financial statements, corporate announcements, government policies, corporate announcements relating to change in broad, dividend policy, bonus and rights issue etc. All these information, once made public are assumed to get absorbed and immediately reflected in the current stock prices. Thus, no individual should be able to reap any excess return as the information about the company or its stock prices is known to all the investors. The security prices thus reflect all information which is publicly available. The semi-strong EMH also assumes that analysts will not be able to use fundamental analysis for reaping any extra benefits by designing a trading strategy based on

publicly available information. Thus, if semi-strong EMH is true, fundamental analysis is of no use.

STRONG FORM EFFICIENT MARKET HYPOTHESIS

In a strong form efficient market, no information is useful. The strong form EMH assumes that including insider information or the private information, all the information are absorbed by the market and is reflected on the security prices. This restricts any abnormal benefits that may be enjoyed by anybody who has such access no such insider information. Thus, the strong form EMH implies that the Board, which manages the company's affairs also cannot make any abnormal profits as a result of insider information which is presume to be known only to them. This is because, for a strong form capital market, no information is useful.

In the past two decades, the areas of EMH have gained more importance, especially in the emerging markets like India. The efficiency of stock market helps to understand the functioning of stock market as well as its contribution to the development of an economy. The Indian stock market is highly volatile and unpredictable in nature. Therefore, an investor faces many risks in the capital market. In the Indian stock market, information is not available freely. The available information is also not transmitted to all the participants of stock market. There exists insider trading too. The investors lack awareness of the same and due to their low level of education the investors' information processing capabilities are very low. They are not in a position to understand clearly market manipulation. The low profile investors, therefore, find it very difficult to select securities on a long term basis. All these factors have led the Indian stock market to be very volatile and thus, the efficiency of Indian stock market needs to be tested for its weak form efficiency.

NEED FOR THE STUDY

The study is aimed at testing the random walk of the returns from different sectors' stocks by using the monthly closing prices. The term 'Efficient Market' was initially applied to the stock market, but the concept was soon generalized to other asset markets. The market prices reflect all relevant information that is relevant for both policy makers and investors. The purpose of this study is to determine which form of Efficient Market Hypothesis is in existence in the Indian stock market as evinced by the stock prices that reflect the information gathered in one point of time. The dependent variables are Efficient Market Hypothesis while the independent variables are the capital market or Stock exchanges. At present, the stock markets are highly volatile. So, it is imperative for investors to know the influence of weak form of efficient market hypothesis in stock market returns. The studies of this type enable the investors to take appropriate decisions and subsequently help in strengthening of the capital market of an economy.

STATEMENT OF THE PROBLEM

The concept of the efficiency of stock market is an issue gaining ground and importance both in academics and business world. Capital markets in emerging countries are not efficient because of their operating characteristics and the nature of the investors.

The investors are generally less educated about the stock market operations in the emerging markets and so such markets will either be weak form efficient or semi-strong form efficient. The Indian financial market had protectionist policies till economic reforms were initiated in the Nineties. So, the Indian stock market is still not developed. It is therefore, a study testing weak form market efficiency has been proposed to be conducted and hence, the title of this study is, "Testing Random Walk Hypothesis in Indian Stock Market – A Study of Selected Stocks Listed on BSE".

SCOPE OF THE STUDY

A study on testing weak form efficiency of Indian stock market including all the stocks traded in all the stock exchanges of the country is practically impossible and so a group of securities traded in the Bombay Stock Exchange of India has been chosen for the study . The present study tests the market efficiency of top 30 companies out of 5342 (as on 6th April 2014) listed in the Bombay Stock Exchange in its weak form of efficient market hypothesis. The Bombay Stock Exchange is one of the oldest stock exchanges in the world. Based on the movement of share prices of the top thirty stocks, the existence of weak form efficiency of Indian stock market may be assumed. The movement of the stock market provides an insight to investors who buy and sell shares and securities with the aim of making profits. The results of the present study may used by the institutions such as banks, stock exchange participants, non-financial institutions, foreign bank and insurance companies. The stock exchange is under the capital market and thus, it plays an important role in economics to determine the economic health of the company and has an essential role in mobilizing the resources for development of the capital market. The efficient market reveals that the past information that will be reflected on the current prices . The information relating to prices of securities is used by the investors to buy, sell or hold the stock or security. Thus, the study relating to efficient market hypothesis helps the fund managers take right decisions.

REVIEW OF LITERATURE

This part of the paper brings out the results of literature survey made for this study. The literature survey included the studies pertaining to testing random walk hypothesis in Indian stock market as well as studies conducted using samples from other countries' stock markets. The results of few important studies in the chosen area of study are presented below.

The studies have been arranged keeping in mind whether the EMH has been proved or disproved for the form chosen for the study. The review covers studies conducted both in the Indian stock market as well as in the stock markets of other countries namely Bangladesh, Colombo, Eastern Europe, India, Indonesia, Karachi, Nigeria, Pakistan and Zimbabwe relating to testing of weak form efficiency hypothesis of stock market. The first part of this literature review focuses on the studies that have proven the existence of weak form efficient market hypothesis and the second part deals with the studies that have disproved the existence of weak form efficient market hypothesis.

Zafar,Tariq (2012) attempted to test the efficient market hypothesis on BSE listed companies before recession. The study aimed at finding out whether there is any relationship between the future prices of stocks and their past performance by choosing companies traded in the BSE. The market prices of 52 weeks for all the 30 companies in BSE Sensex was considered. The stock prices for the period 1st January 2008 to 31st December 2008 was considered for testing the practical applicability of efficient market hypothesis in the Indian stock market. The runs test used for data analysis proved that the share price movement in the share prices of BSE is not affected by past prices and are thus, random in behavior. The author concluded that the weak form of market efficiency is, thus, applicable in the BSE of Indian stock market.

Nayak, Keyur (2012) tested the Random Walk Hypothesis in the Indian Stock Market in another way. He chose 31 companies' stocks from various sectors in the Indian economy traded through the NSE. The scrips chosen were those listed on NSE and belonged to FMCG sector, power sector, infrastructure sector, banking sector, and automobile sector. The data for ten years from 1st April 2001 to 31st March 2011 was considered for the study. The runs test was used for data analysis and interpretation. It was found that the returns of all the scrips which are examined in this study cannot be predicted by the investors using the historical information of the scrips. The reason for the same stated by the author is that the scrips of these companies do not follow certain pattern. The author concluded that the majority of scrips follow random walk. The authors also expressed that the Indian capital is in its strong form and hence, there is less chance for the speculative activities as it is difficult to forecast the prices based on past data.

Jain, Kapil and Jain, Paryul (2013) made an Empirical study of the Weak Form of EMH on Indian Stock Market using the BSE SENSEX data. This study aims to test the randomness of Indian Stock Market using BSE SENSEX as a base index. The daily closing prices of BSE SENSEX for twenty years from April 1993 to March 2013 were used for the study. The twenty year period is further divided into five sub-periods as April 1993 to March 1998, April 1998 to March 2003, April 2003 to March 2008 and April 2008 to March 2013 to uncover any differences in stock movements due to strategic reasons. The tests like runs test, autocorrelation test and Dickey Fuller tests were used for data analysis and interpretation. As the results of these tests are in support of random walk, the authors concluded that the weak form of efficiency is applicable in the Indian Stock Market.

On the contrary, the random character of stock market prices in the Indian stock exchange was studied using NIFTY by Kushwah, Silky Vigg, Negi, Pushpa and Sharma, Ashok (2013). This study examines the weak form of market efficiency of Indian Stock Market (NSE). The data used were the daily stock prices of twenty nine companies considered in the formation of NIFTY from 1st April 1997 to 31st March 2010. By employing runs test, the data were analyzed. The results of runs test support the existence of weak form of efficiency in the National Stock Exchange.

On the other hand, there are also studies that have disproved the weak form efficiency hypothesis of the Indian stock market. The review also covers weak form EMH disproved in other stock markets of the world . Few of such studies have been listed below:

Nisar, Saqib and Hanif, Muhammad (2012)tested the Weak Form of EMH taking evidences from South-Asia". This study examined the weak form of EMH on the four major stock exchanges of South-Asia which includes India, Pakistan, Bangladesh and Srilanka. This study focused on the historical index values on a daily, weekly and monthly basis from 1st July 1997 to 30th June 2011, were used for analysis. Durbin Watson test, Runs test, Variance ratio test and Unit root test were applied to check whether the historical index value on a daily, weekly and monthly basis are random in fashion or not. The above tests did not support the weak form of efficient market hypothesis for South-Asia's four major stock exchanges. Hence, the weak form of efficient market hypothesis is inefficient. The authors concluded that there were no undervalued or overvalued securities and no investor can earn abnormal returns at a given level of risk based on technical analysis.

Khandoker Hossain, Sogir, SiddikAlamNur and Azam (2011)tested the weak form EMH of Dhaka stock exchange of Pakistan. The primary objective of this study was to analyse the weak form efficiency of Dhaka stock exchange using data from banking sector. The daily closing prices of 30 Companies operating in the Bank sector for 11 years were considered for the study. The tests like runs test and Dickey Fuller unit root test were processed and analysed the behavior of daily return of Dhaka Stock Exchange indices.it was found that the Dhaka stock exchange is not efficient in the weak form of efficient market hypothesis. The authors concluded by stating various reasons for inefficiency in the weak form of efficient market hypothesis. They opined that weak regulatory framework, poor corporate governance, lack of accountability, poor institutional infrastructure, and lack of transparency of market transactions are the reasons for such inefficiency.

Another studyby Rabbani, Sajeela, Kamala, Nida and Salim, Mahwash(2013)was conducted using data from Pakistan stock exchange to test for the Weak Form Efficiency. In this study, the daily closing prices of the KSE 100 from January 1999 to December 2010 were collected and the data were grouped further based on the period as : as 1999-2001; 2002-2004; 2005-2007; 2008-2010. The main reason for dividing the period is to evaluate the relationship between stock prices and certain economic conditions prevailed in the economy during the sub-period of the study. The tests like runs test, autocorrelation function test, Augmented Dickey fuller test and Phillips Perron test were used for data analysis and interpretation. The runs test was used to check the random behavior of the data in a given distribution. All the above tests were applied and were rejected except the runs test. Hence, the authors concluded that the KSE of Pakistan was weak form inefficient.

Fernando, PothupitiyageNaradaDamitha (2012) conducted a study on testing the Weak Form Efficiency of emerging Colombo Stock Exchange (CSE) with statistical independence tests and technical trading strategies. This study examined the efficiency of

Colombo Stock Exchange by utilizing statistical tests as well as technical trading rules. The daily market closing prices of All Share Price Index (ASPI) for twenty five years from 2nd January 1985 to 31st December 2010 were considered for the study. Autocorrelation test, runs test and moving average trading strategies were applied to test the predictability of the market. The evidences from the autocorrelation test and runs test does not support weak form of efficiency. The moving average technical trading strategies have predictive ability in the performance of Colombo Stock Exchange.

Haroon Arshad, Muhammad (2012) attempted to test the weak form of efficient market hypothesis on the basis of historical data about the Karachi Stock Exchange's KSE 100 share index. The daily closing price of KSE 100 share index for the period from 2nd November 1991 to 2nd November 2011 was used for the study. Kolgomorov Smirnov goodness of fit test, runs test and autocorrelation test were used for data analysis and interpretation. The results proved that KSE is not a weak form efficient. Hence, the author concluded that the past prices and returns can help to take investment related decisions or in other words the technical analysis is applicable to KSE.

Laurine, Chikoko and William, Muparuri (2013)conducted a study on the Zimbabwe Stock Exchange to see whether it is efficient or not after the country adopted the multiple currency exchange rate regimes. The data for this study consisted of daily and weekly closing prices from 19th February 2009 to 31st December 2012. The tests like runs test and autocorrelation test were used for data analysis and interpretation. The results of the tests used in this study indicate that the Zimbabwe Stock Exchange was not efficient in the weak form when the country used multiple currencies.

Poshakwale, Sunil (1996) conducted a study to test the weak form efficiency and the day of the effect in the Indian stock market. In this study, the daily prices of the BSE National Index (BSENI) from 2nd January 1987 to 31st October 1994 was considered for the study. The index values in local currency were taken from Data Stream International and to compare the performance with the World Portfolio, Morgan Stanley World Dollar Index was used and index values were converted into US dollars by using daily quotations of the Indian rupee to the US dollar. This study presented evidence concentrating on the weak form efficiency and on the day of the week effect in BSE under the consideration that variance is time dependent. It was evinced that the frequency distributions of the prices in BSE do not follow a normal or uniform distribution which is also confirmed by the non-parametric Kolmogorov Smirnov Goodness of fit test. The results of runs test and serial correlation co-efficient tests indicate non-random nature of the series and therefore, violation of the weak form efficiency in the BSE. It was also observed that the average returns were different on each day of the week. The weekend effect was also evident as the returns achieved on Fridays were significantly higher compared to rest of the days of the week.

Das,Suresh and Pattanaik, Sushil (2011) tested the random walk hypothesis for BSE and NSE considering the daily closing prices from 1st April 1999 to April 2011. The closing values of four

leading stock indices namely CNX Nifty, CNX Nifty Junior, BSE Sensex and BSE 100 were considered as samples for the study. The popular ACF test and the runs test conducted to prove the existence of weak form efficiency showed that the series of stock indices in the Indian stock market are biased random time series. The autocorrelation analysis indicated that the behavior of share prices does not confirm the applicability of the random walk model in the Indian stock market. The authors concluded that there were undervalued securities in the market and the investors can make excess returns by correctly identifying the same.

Khan, Ikram, Sana and Mehtab, Mariyan (2011)tested whether the Indian Equity market, especially, the NSE and BSE are weak form efficient or not and also tested whether the Random Walk Model is present in the Indian capital market or not. The data considered for the study was the daily closing prices of two major stock indices of India which is the BSE Sensex and S and P CNX Nifty from 1st April 2000 to 31st March 2010. Runs test was used as major tool of data analysis and interpretation. It was found that in both the cases, i.e., NSE and BSE, the random walk model is not present. The runs test employed in this study, rejected the presence of random walk and supported that Indian Capital market is not weak form market efficient. This implies that the movement of stock market index cannot be determined by the movement of the present stock prices or anticipate future movement in price. The authors have concluded that the Indian Capital market has evolved and developed and so, is not weak form market efficient.

Srinivasan (2010) examined the random walk hypothesis to determine the validity of the weak form efficiency for the two major stock markets in India. The data for this study consisted of daily closing prices of two major Indian stock market indices like S and P CNX nifty and Sensex from 1st July 1997 to 31st August 2010. The popular tests applied in this study were Augmented Dickey fuller test and Phillips Perron test conducted. This study suggested that the Indian stock markets did not show characteristics of random walk and were not efficient in the weak form implying that stock prices remain predictable. Hence, the authors concluded that the results did not support the validity of weak form efficiency for stock market returns of Indian stock exchanges.

Jana, Samiran and Meher(2012) considered the returns of eight broad market indices for testing the weak form efficiency of Indian stock market. The data consisted of daily closing pricesof six years from 1st January 2006 to 31st December 2011. Runs test, serial correlation test and spectral analysis techniques on the monthly data were used for data analysis and interpretation.. The random walk model held only for Iron and Steel and Cement industries. The main objective of the study was to check whether the returns of the eight broad market indices are random or not. In many cases, the runs test and serial correlation test were applied to see the randomness of return of stock price at the Indian market. The hypothesis is stated as the eight broad market indices are random or not. Tests like runs test and serial correlation test were used to check whether the indices are random or not. Out the eight broad market indices, four indices were chosen from the BSE(i.e, BSE 100, BSE 200, Sensex, BSE 500) and another four

were chosen from the NSE (i.e, S and P CNX Nifty, CNX 100, CNX 200 and S and P CNX 500). By applying the runs test, it was found that the returns of BSE- Sensex and BSE- 100 are random, but, BSE 200 and BSE 500 are not random. In the case of NSE, returns of S and P CNX Nifty and CNX 100 are random, but CNX 200 and S and P CNX 500 are not random. It ignores a certain amount of information and unable to capture huge fluctuation in number. Hence, weak form of efficient market hypothesis of NSE and BSE of India is inefficient.

Shukla, Hitesh and Sakhareliya, Ravi (2013) examined the random walk hypothesis to determine the validity of weak form efficiency for two major stock markets (BSE and NSE) in India. The data for this study consist of daily closing prices of SENSEX and S and P CNX Nifty from 1st January 2003 to 31st December 2012 comprising of 2497 observations. The two indices were tested for normality followed by application of runs test, Kolmogorov Smirnov test, autocorrelation test using Q-statistic, multiple variance ratio tests using homoscedastic and heteroscedastic test estimates. The results of this study show that Indian stock market indices do not follow random walk. Hence, the Indian stock markets are not weak form efficient.

Kumar, Sushil and Singh, Manisha (2013) considered the S&P and CNX Nifty indices to know that whether the Indian Stock market is efficient or inefficient at weal level. The data used were the daily closing values of the S and P CNX Nifty and CNX Nifty Junior from 1st January 2000 to 31st March 2013. Unit root test, runs test and Kolmogorov Smirnov test were applied. The results revealed that the Indian stock markets do not exhibit weal form of market efficiency.

Hassan, Mohd.Mubasher and Sangmi, Mouh-i-Din (2013) conducted an invstigation as to the efficiency of efficient market hypothesis in the context of Indian securities market. This study is based on six indices like Sensex 30, BSE 100, BSE 200, BSE 500, BSE Mid Cap and BSE Small Cap. The monthly closing prices of these six indices from January 1991 to August 2013 were collected and analyzed by employing Kolgomorov Smirnov test, runs test, Serial correlation test, autocorrelation function and Augmented Dickey Fuller test. The results of all tests indicate that the Indian stock market does not follow the random walk. Hence, the authors conclude that technical analysis of indices can be put to use.

Joshi, Divyang (2012) conducted a study to know the efficiency level and the nature of the Indian Stock Market. The data used in this study were the daily closing prices of BSE 30, BSE 100, BSE 200, BSE 500, BSE Mid Cap and BSE Small Cap from 1st January 2001 to 31st December 2010 with a total 2498 observations. By using runs test, the data was analyzed. The result of runs test indicates that the findings support the random walk hypothesis in short duration, but, in long term it does not. Hence, all the indices of Bombay Stock Exchange do not support the weak form of market efficiency.

The literature review, thus, shows mixed results for weak form efficiency hypothesis of Indian stock market. The present study will add to the existing field of literature in strengthening the hypothesis of the study.

OBJECTIVES OF THE STUDY

The following are the objectives of the study:

1.To understand the weak form of Efficient Market Hypothesis;

2.to test the weak form efficiency of Indian stock market;

3.to test whether the Indian capital market follows Random walk model; and

4.to understand the practical applicability of EMH theory in the Indian context.

HYPOTHESES OF THE STUDY

a.H0: The price movement in the share price of each sector is not affected by the past prices.

H1: The price movement in the share price of each sector is affected by the past prices.

b.H0: The Indian stock market is not efficient in its weak form.

H1: The Indian stock market is efficient in its weak form.

RESEARCH METHODOLOGY

The present study is empirical in nature. The study is based on secondary data. The top thirty companies traded at the Bombay Stock Exchange have been considered for the study. The companies so chosen belong to different sectors contributing for the growth of the economy at large. Secondary data relating to closing prices of selected companies has been extracted from the website www.yahoofinance.com. The data consists of monthly closing prices of top 30 companies listed in BSE. The study spans ten years starting from 1st January 2003 to 31st December 2013. The data so collected was analysed using SPSS 16.0 version.

The study is focused to test the weak form market efficiency hypothesis in the Indian stock market by applying runs test. Runs test is also known as 'Wald-Wolfowitz test'. The Runs test is a non-parametric test. It is used to test the randomness of the series. It considers only the sign of the price changes but not the magnitude of the price change. In other words, it shows the direction of price change. It does not require the specification of the probability distribution. It determines whether successive price changes are independent. Thus, they are essentially concerned with the direction of changes in the time series. The change in absolute value is ignored in this test and only the sign change like ' + ' or ' - ' is considered. That is, an increase in price is represented by a ' + ' sign and a decrease in the price is showed by a ' - ' sign. When the price does not change it is represented as ' 0 '. A ' run ' is a set of consecutive prices of the same sign. The actual number of runs is compared with the expected number of runs. If the actual number of runs is not significantly different from the expected number of runs, then the price changes are considered dependent.

In the runs test, the actual number of runs is compared with the expected number of runs. The expected number of runs can be obtained using the following formula-

Table 1: Runs Test Results for the top 30 Companies Listed in the BSE
(Data Period: 1st Jan 2003 to 31st Dec 2013)

SI. No	Company Name	No. of Runs	Z Value	Asymp. Sig (2) tailed
1	ACC Ltd	67	0.011	0.992
2	Ambuja Cements Ltd	69	0.374	0.708
3	Axis Bank Ltd	72	0.885	0.376
4	Bharat Petroleum Corporation Ltd	78	1.972	0.049
5	Bharat Heavy Electricals Ltd	75	0.449	0.653
6	Cipla Ltd	70	0.535	0.592
7	Escorts Ltd	70	0.527	0.598
8	Gail India Ltd	71	0.710	0.478
9	GlaxoSmithKline Consumer Healthcare Ltd	59	-1.377	0.169
10	HDFC Bank Ltd	74	1.226	0.220
11	HDFC Ltd	66	-0.151	0.880
12	Hero Motocorp Ltd	69	0.360	0.719
13	Hindalco Industries Ltd	64	-0.522	0.602
14	Hindustan Unilever Ltd	67	0.067	0.947
15	ICICI Bank Ltd	67	0.011	0.992
16	Infosys Ltd	72	0.977	0.328
17	ITC Ltd	75	1.545	0.122
18	L&T Ltd	65	-0.339	0.734
19	Mahindra & Mahindra Ltd	51	-2.796	0.005
20	ONGC Ltd	78	1.935	0.053
21	Ranbaxy Laboratories Ltd	75	1.410	0.159
22	Raymond Limited	61	-0.961	0.336
23	Reliance Industries Ltd	66	-0.175	0.861
24	SesaSterlite Ltd	56	-1.740	0.082
25	State bank of India	67	0.067	0.947
26	Sun Pharmaceuticals Industries Ltd	63	-0.390	0.697
27	Tata Motors Ltd	61	-1.039	0.299
28	Tata Power Company Ltd	84	3.001	0.003
29	Tata Steel Ltd	72	0.977	0.328
30	Wipro Ltd	62	-0.852	0.394

$E(r) = (2n1n2)/(n1+n2+1)$

where,

n1= number of positive runs

n2= number of negative runs

The stock returns are measured as the continuously compounded monthly percentage change in the share price in order to avoid the influences of extreme stock values.

$Rt = (Pt-Pt-1)/Pt-1 \times 100$

where,

Rt=Return in the period 't'

Pt=Monthly closing share price

Pt-1=Monthly closing share price for the preceding period

To obtain actual number of runs, first calculate the mean and compare with each return value. If the return value is more than the mean value then consider it as positive, if the return value is less than the mean value then consider it as negative. By this we get the arrangement of values above and below the mean.

The standard error of the expected number of runs can be obtained as-

$S.E = \sqrt{(2n1n2)}((2n1n2-n1-n2)/(n1+n2)^2(n1+n2-1)$

In order to test the significant difference between the actual number of runs and expected number of runs, the test statistics employed will be-

$Z = R - E(r)/S.E$

If the Z value lies within ±1.96 then the Ho is accepted and the results show that the price movements in the share prices are random in behavior and supports the hypothesis of weak form of market efficiency.

Data analysis and Interpretation:

Table 1 gives the details of no. of runs and Z value for the returns of top thirty companies listed in the BSE for the period from 1st Jan 2003 to 31st Dec 2013.

The calculated values of runs test (Z) are compared with the critical value at 5% level of significance. It may be observed from the table 1 that, out of the 30 companies, the value of Z for all the companies except Bharat Petroleum Corporation Limited and Tata Power Company Limited is less than the critical value of 1.96 at 5% level of significance. So, the null hypothesis that the price movement in the share prices of BSE is not affected by past prices is accepted. The result shows that the price movements in share prices of BSE are random in behavior. This implies that one cannot use the historical prices of shares for predicting their future prices. This has proved has proved that the weak form of market efficiency or the random walk theory is applicable in the BSE.

Research Implications of the Study

The results of the study prove that the Indian stock market is yet to develop in order to become strong or move towards semi-strong form.   This limits the strategies to be applied by investors while taking investment decisions.   The analyst cannot use technical analysis for investment decisions as it is not possible to use historical prices for predicting share prices and consequently, the returns also.

Limitations of the study

The following are the limitations of the study:

a.The results may not be the same when the sample set of companies is changed.

b.As the BSE is efficient in its weak form the future prices of shares cannot be predicted by analyzing prices in the past.

c.Excess returns cannot be expected to be earned in the long run by using investment strategies based on historical share prices.

d.Technical analysis cannot help investors to make a continuous gain from the market.

CONCLUSION

To conclude, the present study revealed that the price movement in the share prices of Bombay Stock Exchange is not affected by their past prices. The price movements in share prices of stocks traded through the Bombay Stock Exchange of Indian stock market are random in behavior. This implies that one cannot use the historical prices for predicting the future prices of stocks. It was, thus, proved that the weak form of market efficiency or the Random Walk Theory is applicable in the Bombay Stock Exchange based on the share price movement of thirty sample companies chosen for the study. In other words, the Indian capital market is proved to be efficient in its weak form.

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