Testing Weak Form Efficiency for Indian Stock Markets

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ABSTRACT

The weak form of market efficiency hypothesis (EMH) states that the stock prices reflect all the past information making technical analysis futile and abnormal profits cannot be made by studying the past & present stock prices to predict future stock prices.

Numerous studies have been conducted to test the stock market efficiency world ever particularly in the second half of twentieth century. After initial later, studies have produced incredible evidence supporting market efficiency across the globe. The results obtained from these studies were considered robust the weak form of efficiency. As a result it has been conclusively established that stock market is efficient in weak has been conclusively established that stock market is efficient in weak form. Occasionally, studies negating these robust findings were also noticed over these years.

This study is concerned with testing the weak form of efficient market. In order to test whether the random walk hypothesis is valid in the Indian stock market, the present study is based on the following hypothesis:- *"The successive share price changes in Indian Capital Market are not dependent on the past price movements."*

Keywords: Indian Stock Markets, Weak Form Efficiency, Random Walk Theory.

Introduction

An efficient capital market is one in which the prices of the securities are adjusted according to the availability and infusion of new information and therefore current prices of the securities reflect all the information about the security. Also it can be termed as informational efficient market. The new information is regarded as the one which was not known before and is unpredictable. Many interesting and academically important researches have been done to analyze the efficiency of Markets across the globe. An initial and important premise of the efficient market is a combination of assumptions such as that there are a number of profit maximizing investors that exist in the market and carry out the valuation and analysis if the securities exclusive of each other. Secondly, information is fairly unpredictable and occurs in a random order and finally, the investors adjust the stock prices quickly in response to the new information showing that one should expect random and independent price changes. Most of the historical work done on the efficient capital market was an empirical testing based on the Random Walk behaviour without much theory behind it. The random walk behaviour suggests that the changes in the stock prices occur randomly. Fama (1970) organized and presented the theory for the efficient market hypothesis, also called the Random Walk Theory. Eugene Fama is widely thought and accepted as the king of efficient market hypothesis, extremely vital concepts were proposed by Fama that have defined the debate on efficient markets. Three types of efficiency were proposed by Fama are Weak form, Semi-strong form and Strong form efficiency. These are explained in background of what information is factored in price. Each of the above mentioned type has different connotations for how do the markets undertake their assigned tasks.

Types of the Efficient Market Hypothesis

Since the EMH is detailed to have incorporated and reflecting all relevant and available information in the stock prices, the forms of the EMH have been distinguished from one another based on the extent to which the information is available and incorporated.

1. Weak Form Efficiency:

In the first type (weak form efficiency), the forecasting or prediction of the future prices is not possible from the past data. Investment strategies based on the past data of the

share price cannot help to achieve surplus in the long run. Some forms of fundamental analysis can help to achieve surplus but not on a regular basis. Share prices do not show any serial dependencies, which means there is no pattern similar to the asset prices. This means that information which is not present in the price series determines the price movements of the future. Therefore, the prices will have to follow a random pattern.

2. Semi-Strong Form Efficiency:

The second type (semi strong form efficiency) it states that when ever new information is publically available the share prices adjust to them almost instantaneously and without any bias, in a way that no surplus can be earned with trading on the publically available information. The semi string efficiency states that both the fundamental analysis and technical analysis techniques will not be able to reliably produce the surplus. In order to test for the semi strong form efficiency, the adjustments must be of acceptable size and should be instantaneous to the news which was unknown before this. To test what is mentioned in the previous line, after the initial change consistent upward or downward adjustments should be searched for. If the upward or downward adjustments are found this implies that the investor had understood the information with a bias, therefore rendering it inefficient.

3. Strong Form Efficiency:

In the third type (strong form efficiency), all the information is given or obtained by the share prices, whether it is public or private and surplus cannot be earned by anybody. This type of efficiency is not possible if there are legal obstructions to the private information becoming public. To test for this type of efficiency, there should exist, a market where the people investing cannot regularly earn surplus longitudinally. EMH is widely thought to be the key element of the conjectures in finance but on the other hand it is argumentative and repeatedly disputed. It is argued by the followers that it is fruitless to anticipate trends in the stock market prices by financial analysis techniques.

Review of Literature

Numerous studies have been conducted to test the stock market efficiency world ever particularly in the second half of twentieth century. After initial later, studies have

produced incredible evidence supporting market efficiency across the globe. The results obtained from these studies were considered robust the weak form of efficiency.

In Indian context, a number of attempts have been made to examine stock market efficiency in the weak form. Rao conducted the first study and Mukherjee (1971) produced results supporting weak form efficiency on the basis of stock prices of a single company (Indian Aluminum). They used spectral analysis to test the random walk model by using the weekly average prices of one company over a 16-year period (1955-70). They separated the trend component using simple moving averages, and descended series was used as the input for spectral analysis. A large number of spectral estimated were found to fall with in the appropriate 90% confidence level.

Ray (1976) constructed index series for six industries as well as for all industries and conducted run test, serial correlation test and spectral analysis for tested the hypothesis of independence on these series. He studied the period from January 1966 to 1972. He obtained mixed results, though evidence was more towards rejection of the null hypothesis of independence. He found that the random walk model held only for iron, steel and cement industries.

Sharma and Kennedy (1977) conducted a comparatively study of the stock price behaviour in Bombay, London and New York Stock Exchanges by analyzing monthly indices for the period 1963-73 to test the random walk theory in India and to compare this behaviour to that of stock markets in the U.S. and England with the help of run and spectral analysis.

Barua (1981) proved the validity of random walk hypothesis in the Indian stock market through the study of daily closing prices of 20 shares together with the Economic Times Index from July 1977 to June 1979.

In a comprehensive study, O.P. Gupta (1985) tested the RWH by employing two data sets from Indian Capital market during the period Jan, 1971-March 1976 by using serial correlation and run tests. The first data consisted of two commonly used series of index no. of share prices, VIZ (a) The Economic Times Index Number of share prices complied on a daily basis and (b)The Financial Express Series of Index number of Equity Prices; on a daily series, and the other a weekly series. The second data set comprised weekend closing prices of 39 equity shares from amongst those included in the Economic Times

Index and were on the "cleared List" from four principal stock exchanges, Viz Bombay, Calcutta, Ahmedabad and Delhi. The empirical results obtained in the study confirmed the applicability of the random walk theory to Indian Stock Market as appropriate description of equity share price behaviour in India, thus suggesting that Indian stock Exchanges were weekly efficient.

A comprehensive study on efficiency of Bombay stock exchange was conducted by Yalawar (1988) and found stock price behaviour to be random and the market as an efficient. But these findings were questioned by Bhole (1991) on the ground that this sample was restricted to some companies, which caught the fancy of investors and speculators and thus resulted in the better performance of these companies.

Grossman (1995) studied that shares of many companies of different countries on half yearly basis and concluded that market efficiency is in high weak form in Asian countries, moderate in European countries and very low in American countries. He said, "There are incentives to directly collect information to help forecast the dynamic feasibility of people"s plans and to attempt to profit from their inability to realize their plans".

Subrata Kumar Mitra (2000) conducted an empirical study with BSE-Sensex and found profitable trading opportunity in Indian Stock Market. He observed that returns exhibit positive serial correlation in short-term and when the effect of any information is not quickly absorbed in price, the possibility of slow adjustment causes serial correlation.

Statement of Problem:

The problem finally selected to work on is related to efficiency of the Indian Capital Market. Not much work has been done on this particular topic in India up till now. For further and deeper explorations into the topic, it presents a major possibility. After consideration the problem decided is stated as:-

"Efficiency of Indian Stock Market – Testing of Weak Form".

Need of the Study:-

The present study became necessary due to the following reasons :

1. The studies conducted in the field of share price behaviour require to be updated frequently. Therefore, the present study is an extension of the existing works on EMH.

2. Generally, the market index tends to show the direction of share price changes. Therefore, this study examines the independence of the successive price changes in the market index series.

Objective of the Study:-

The weak form tests are concerned with the validity of using the past history of prices to predict future price. In this context the study is considred primarily with the objective to provide a systematic and logical explanations to following questions :-

1. Do the prices really move as the random number behaves?

2. Do the prices over a period of time have sufficient serial dependence to allow investors to predict future price movements by studying past price trends?

3. Can trading strategies based on price movements provide opportunities for abnormal profit?

The present study addresses all the aforesaid questions. Thus, the objective of present study is to find out if the movements of share price in the Indian Capital Market are dependent on previous. In other words it aim at examination of stock market efficiency of Indian Capital Market in the weak form. In this way it relates to testing the validity of the random walk theory of stock prices.

Hypothesis:-

Hypothesis is a proposition, condition or principle, which is assumed, perhaps without belief in order to draw out its logical consequences and by this method to test the accord with facts, which are known or may be determined. Similarly, stated a hypothesis helps us to see and appreciate:-

1. The kind of data that must be collected in order to answer the research question.

2. The way in which it should be organized most efficiently.

This study is concerned with testing the weak form of efficient market. In order to test whether the random walk hypothesis is valid in the Indian stock market, the present study is based on the following hypothesis:- "The successive share price changes in Indian

Capital Market are not dependent on the past price movements." (i.e. the successive price changes follows a random walk or Serial correlation coefficients (=0) are equal to zero).

Scope of the Study:-

As described earlier efficiency in Indian stock market to a great extent the level of weak form is exist. For testing this form of market efficiency here taken 50 companies of National Stock Exchange (NSE) for best representation. To get the good conclusion of the study all companies are taken on random basis.

Research Design:-

The main purpose of this study is to make a analysis of daily and monthly stock prices.

To conduct this study the following steps are taken:-

(i) Sample size:-

A sample is a subset of population units. On the basis of sample study the behavior of the mass phenomenon can be predicted and generalized. The sample for this study consists of 50 companies. Random Sampling has been made while taking these companies. Data related to four years and six months starting from the 1st January 2006 to 20th June 2010 is taken to make the study effective.

(ii) Source and collection of data:-

The present study is of analytical and explorative in nature. To complete the study, data is collected purely from secondary sources. The data consists of daily prices and monthly prices of share traded on the National Stock Exchange (for the sample) for the period of four years six months Jan 2006 to June 2010. The time period chosen in quite recent and quite buoyant. Besides this, an in depth study of various books, articles and Journals mainly Journal of Finance and Journal of Commerce, Vikalpa are made to help in understanding the topic and to decide the tools of analysis. The main source of collection of data is "Economic Times".

(iii) Data Analysis:-

After the data collection, it is examined with the help of statistical tool - Run test where it is appropriate. The results of run test on daily and monthly prices are tabulated in proper form. After tabulating the results, deep analysis and interpretation has done. A comparison also has done of daily stock price results and monthly stock price results.

Limitations of the Study:-

Due to limited time, money and resources, the universe of the study has been restricted to India Stock Market. The conclusions drawn in the present study are subject to authenticity of the data available. The study is mainly based on secondary data. Due to vastness of the size of sample, the deep and detailed study is not possible.

Random Walk Model:-

The random walk process is an example of a stochastic time series. Fama (1965) has used the random-walk process as a model for the movement of stock market prices. The general interpretation of the random walk Hypothesis suggests that future price changes are independent of past price movements. Hence, historical data does not provide any meaningful information for predicting future prices or states, and no investor can earn excess returns by developing trading rules based on historical price or return information. The random-walk hypothesis is also called the Weak-Form Efficiency of the market.

The Random Walk Model can be stated as follows:-

$$E \ (P/Pt–j \ for \ j > 0) = Pt–1$$

Result of Runs Test-Monthly Stock Prices	No. of Shares
Observed runs greater than the expected runs	16
Observed runs greater than the expected runs with adding continuity factor	05
Expected runs greater than the observed runs	29
Difference between observed runs and the expected value :- 　1.Significant at 1% level 0 　2.Significant at 5% level 2	

Thus, the run test results for monthly prices do not show any non-random behaviour during the study period. Since the value of standardized variable „Z" are insignificant in all the cases, the dependence or significance displayed by two companies (Atlas Corp. and HDFC) is negligible.

In the above research, has been shown the results of run test in every company of daily prices and monthly prices and the null hypothesis is accepted in most of the companies, which means that the null hypothesis of this study in Indian Capital Market is efficient in the weak form, but one company in daily prices testing and two companies in monthly prices testing at 5% level of significance are exception of the conclusion, which rejected the null hypothesis of the weak form of the efficiency of the Indian Capital Market and shows that Indian stock market is not efficient in the weak form.

But the results of all companies of NSE taken in sample accept the null hypothesis of weak form of market efficiency; no one is the exception here. So on the conclusion basis of this study, it can be said that Indian Capital Market is efficient in the weak form as per the runs test while taking sample raw data of fifty companies.

Conclusion:-

Runs test is applied for calculating the results of daily prices and monthly prices for all the fifty companies randomly selected from the National Stock Exchange (NSE). The null hypothesis i.e. randomness hypothesis will be rejected at 5% level of significance in favour of the alternative hypothesis (non-randomness hypothesis) if observed value of Z>1.96 and vice versa. And the null hypothesis i.e. randomness hypothesis will be rejected at 1% level of significance in favour of the alternative hypothesis (non-randomness hypothesis) if observed value of Z>2.58 and vice versa.

At last, there is only one company named Hindalco reject the randomness hypothesis because, its Z value (-2.564)>1.96 at 5% level, rest 49 companies accept the hypothesis and overall (50) companies accept the hypothesis at 1% level in daily prices. On the other hand, monthly stock prices runs test result also support the daily prices runs test result. There are only 2 companies named Atlas Corp. (Z=2.2228) and HDFC (Z=2.2501) reject the hypothesis. Rest 48 companies accept the hypothesis at 5% level of significance because, there „Z" value are less than 1.96 and all companies are accepted the hypothesis at 1% level of significance because all company"s „Z" value are less than 2.58. Daily prices and monthly prices result are same at 1% level of significance. These differ at 5% level just by one company. There are only 2% company"s result is significant in case of

daily price testing and 4% company"s result are significant in case of monthly price testing.

Thus, the results of runs test-daily and monthly, suggest that, in general, successive price Changes appear to occur at random in almost of the shares analyzed. Therefore, it can be infer that share price behaviour in the Indian Stock Market follows the random walk model. Hence, Indian Stock Market is Weakly Efficient. So, on the conclusion basis of this study, it can be said that Indian Capital Market is efficient in the weak form as per the runs test while taking sample raw data of fifty companies.

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