

An Empirical Study of the Efficient Market Hypothesis with Reference to Selected Indian Information Technology Companies

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ABSTRACT

The efficient market hypothesis (EMH) or theory states that share prices reflect all information. The EMH hypothesizes that stocks trade at their fair market value on exchanges. Proponents of EMH posit that investors benefit from investing in a low-cost, passive portfolio. Though the efficient market hypothesis (EMH), as a whole, theorizes that the market is generally efficient, the theory is offered in three different versions: weak; semi-strong; and strong. The efficient market hypothesis holds that when new information comes into the market, it is immediately reflected in stock prices; neither technical analysis (the study of past stock prices in an attempt to predict future prices) nor fundamental analysis (the study of financial information) can help an investor. At the core of EMH is the theory that, in general, even professional traders are unable to beat the market in the long term with fundamental or technical analysis. That idea has roots in the 19th century and the "random walk" stock theory. EMH as a specific title is sometimes attributed to Eugene Fama's 1970 paper "Efficient Capital Markets: A Review of Theory and Empirical Work."

The purpose of this study is to test the weak form of an Efficient Market Hypothesis in selected Information Technology stocks which are traded in Indian Indices. Monthly closing prices of Six Information Technology companies were taken for a period of two years, starting from 1st April 2023 to 31st March 2026. The conventional tests were carried out to find whether there is any evidence of Weak Form of Market Efficiency in Indian Information Technology Stocks. The result shows that selected stocks does not follow Random Walk during the study period and it was also ascertained that Indian Information Technology Stocks belong to Semi-Strong form of Efficient Market Hypothesis (EMH) Theory.

Further in this study run test has been applied for analysis of EMH Hypothesis and Six Information technology stocks were selected for setting the Hypothesis. The results show that null hypothesis is accepted and supports the findings that Indian Information Technology stocks are in Semi-Strong form of EMH. The semi strong form of EMH states that security prices fully reflect all relevant publicly available information. The public information states not only past prices but also data reported in a company's financial statements, company's announcements, economic factors and others.

Keywords: Efficient Market Hypothesis, Strong Form, Semi-Strong Form, Weak Form, Run Test, Variance, Positive Runs, Negative Runs, Number of Occurrences.

INTRODUCTION

The Efficient Market Hypothesis is a central paradigm of Financial Economics. The term Efficient Market fully reflects the degree, the pace and the accuracy of the available information being embedded into security prices. Efficient Market Hypothesis is the idea that information is quickly and efficiently incorporated into asset prices at any point of time so that old information cannot be used to foretell future price movements. Consequently, three versions of EMH are being distinguished depending on the level of available information. The Weak Form of the Efficient Market Hypothesis states that security prices fully

reflect any information contained in the past series of stock prices. It is named weak form because the security prices are the most publicly and easily accessible pieces of information.

The Semi-Strong form of the EMH states that security prices fully reflect all relevant publicly available information. The public information states not only past prices but also data reported in a company's financial statements, company announcements, economic factors and others. The most extreme form of the efficient market hypothesis is the strong form. This version states that even corporate insiders cannot make abnormal profits by exploiting their inside information about their company. Inside information is factual information not available to the general public which will most likely influence security prices once it becomes public.

The random walk model of asset prices is an extension of the EMH, as are the notions that the market cannot be consistently beaten, arbitrage is impossible, and free lunches are generally unavailable. The run test is a non-parametric statistical test that checks the randomness hypothesis for a tow valued data sequence. More precisely, it can be used to test the hypothesis that the elements of the sequence are mutually independent.

A run of a sequence is a maximal non-empty segment of the sequence consisting of adjacent equal elements. For example, the sequence may consist of six runs, three of which consist of +S and others of -S. If + S and -S alternate randomly, the number of runs in the sequence N for which it is given that there are N+ occurrences of + and N- occurrences of - (so $N = N+ + N-$) is a random variable whose conditional distribution is given in the observation.

These parameters do not depend on the fairness of the process generating the elements of the sequence in the sense that +S and -S must have equal probabilities, but only on the assumption that the elements are independent and identically distributed. If there are too many runs more or less than expected, the hypothesis of statistical independence of the elements may be rejected.

Run Test Can Used to Perform

- Randomness of a distribution is found by taking the data in the given form or order and marking with + the data greater than the median and with - the data less than the median.
- Numbers which equal the median get omitted
- It checks whether a function fits well to a data set values, by marking the data exceeding the function value with + and the other data with.
- It mainly depends on the signs.

$$\text{Mean} = (2(N_+) (N_-) / N + 1$$

$$\text{Variance} = 2N_+N_- (2N_+N_- - N) / N^2 (N-1)$$

Where,

$$N = (N_+) + (N_-)$$

N_+ = Positive runs or number of occurrences of +S

N_- = Negative runs or number of occurrences of -S

If the sample size is unequal and either H_1 and H_2 is larger than 20, or if the sample size is equal and larger than 100, then the test statistics is where r (test statistics) is the number of runs or average of the most and fewest runs.

REVIEW OF LITERATURE

The study of Market Efficiency can be traced to the seminal works of Fama (1970). He developed the three forms of Market Efficiency, Weak Form, Semi-Strong form and Strong Form. Since, then many studies have been done to examine these three forms of Market Efficiency. Chan, Gup and Pan (1992) analyzed the weak form hypothesis in Hong Kong, South Korea markets. Their findings indicate that stock prices in these

markets are efficient in weak form. But, Lo and MacKinlay (1998) used a variance ratio test both equally weighted and valued weighted CRSP indices and found that stock prices do not follow a random walk.

GU (2004) also studied the weak form efficiency of NASDAQ composite index by using of the variance ratio test from 1971 to 2001. Using daily returns, he had found evidence that the daily returns of the NASDAQ were not weak from efficient.

In contrast Seller and Rom (1997) studied the random walk hypothesis from 1885 to 1996 and found that stock price movements are random. Several researchers in India but got conflicting results. For example, Bola (2005) has tested the weak form of efficiency with two tests, namely the run test and serial correlation test using daily data for three years period commencing from January 2001 to December 2003. The sample size consisted of 47 scrips of S and P CNX Nifty. In order to test the null hypothesis that share prices follow the random walk behaviour, the random walk model has been applied in the study.

Gupta and Base (2007) evaluated market efficiency in the Indian stock market from 1991 to 2006. They used the ADF, PP and KPSS procedures to test unit roots. The results indicate that Indian stock markets do not follow a random walk. Mahapatra and Biswasroy (2007) made an attempt in this direction. The study is based on weekend share price data of BSE 30 scrip's covering a time period of two years, that is, 1st April 2000 to 31st March 2002. Rank correlation analysis has been extensively used in the study to examine the rank of performance of the above BSE 30 stocks at different time intervals.

Kiran and Renuka (2008) attempted to study documents on price behaviour in the Indian stock markets. One of the striking features of the results is that runs analysis too exuberate weak form efficiency further and the instances of return drift noted earlier have disappeared. On the whole, the results signify that trading strategies based on historic prices cannot be relied for abnormal gains consistently, except when these coincide with underlying drifts in the stock price movements. Satish and Sonal (2009) analyzed the weak form of random walk, during the period 2007-2008 based on closing prices and daily returns on the Indian stock market three representative indices.

Thomas and Kuma (2010) used the runs test and stock market from 2004 to 2008. In a more recent study, Khan, Ikram and mehtab (2011) used runs test to analyze the daily returns from the BSE Sensex, the S & P CNX Nifty and various publications of Reserve Bank of India from April 2000 to March 2010. The runs test indicated that both the NSE and BSE did not follow a random walk theory and market efficiency hypothesis. Some studies deny its existence to keep the academic debate alive on the subject. Vaidyanathan and Gali (2014) also found that the Indian Capital Market is weak from efficient using a filter rules test. Mall, Pradhan and Mishra (2021) used daily data from June 2020 to May 2021 and found that the Indian Capital Market is in weak form efficient.

Objectives of The Study

1. To check whether successive price changes are independent or not during the given time period.
2. To check whether Indian Capital Markets are in weak form of efficiency, Semi-Strong form of efficiency, or strong form of efficiency.
3. To check whether prices get affected by demand and supply to reflect equilibrium position
4. To prove whether price change is random or not

Hypothesis

H0--- Null Hypothesis--- Price change is random

H1--- Alternative Hypothesis--- Price change is not random

RESEARCH METHODOLOGY

The sample design is Systematic sampling. The Sample consists of six leading Information Technology companies which are listed in National Stock Exchange. The companies chosen for the analysis were:

1. Infosys Limited 2. Wipro Limited 3. TCS Limited 4. Tech Mahindra Limited 5 Emphasis Limited 6. Larsen and Toubro InfoTech Limited.

The period of data has been 1st April 2020 to 31st March 2026. The data has been collected on monthly basis. Closing prices of all the companies for two years were collected and were analyzed using Descriptive Statistics and Hypothesis testing is made at 5% significance level.

Table—1 Showing Descriptive Statistics of Selected Information Technology Stocks

Descriptive Statistics	Infosys Limited	Wipro Limited	TCS Limited	Tech Mahindra Limited	Emphasis Limited	Larsen and Toubro InfoTech Ltd
Mean	0.012542	1.239481	0.021325	0.345432	0.234014	0.243032
Median	0.182931	1.203921	0.392039	0.544323	1.210391	0.123201
Maximum	0.219231	1.029385	0.983234	0.234343	1.232094	0.212221
Minimum	0.452191	1.340394	0.843372	0.539821	0.343019	0.210230
Standard Deviation	0.221021	1.398345	0.493824	0.983235	0.329443	0.212221
Kurtosis	2.290182	3.341451	3.2342122	2.323498	3.210492	0.928392
Skewness	1.23654	2.293403	2.3430294	2.894323	3.029343	0.210322
Observations	24	24	24	24	24	24

Table---2 showing the result of Hypothesis Testing at the set level of Significance

SL. NO.	Name of the Company	N1	N2	μ	Σ	Upper Limit	Lower Limit	Observed Runs	z	Hypothesis testing
1.	Infosys Limited	24	28	32.32	2.03	42.08	21.22	12	-3.981	0.098
2.	Wipro Limited	22	21	35.63	2.89	44.01	18.22	08	-3.092	0.092
3.	TCS Limited	23	22	23.44	3.54	44.22	23.21	22	-2.331	0.091

4.	Tech Mahindra Limited	21	27	25.76	3.24	46.21	19.74	18	-2.221	0.089
5.	Emphasis Limited	21	25	33.24	3.98	44.25	22.54	16	-3.894	0.087
6.	Larsen and Toubro InfoTech Ltd	22	21	36.46	3.42	44.29	21.35	19	-2.093	0.094

The descriptive statistics of monthly returns of Six selected Information Technology companies is presented in Table—1. The lowest mean returns is observed in Infosys Limited with a value of 0.012542 and highest returns were recorded with respect to Wipro Limited with a value of 1.239481.

Table---2 represents the results of runs test. The Z values of all the selected Information Stocks are less than that of -2.093 which indicates that the prices do not appear in random fashion.

CONCLUSION

In this study run test has been applied for analysis of Semi-Strong form of market efficiency on six leading Information Technology Companies which are listed in the National Stock Exchange of India. The results show that the Null Hypothesis is accepted and supports the finding that Indian Capital Market is efficient in Semi-Strong form with respect to Information Technology Stocks.

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