



## Efficient Market Hypothesis: A Critical Review of Theory and Its Implications for Investment Decision

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### Abstract

The efficient market hypothesis is concerned with the behaviour of prices in asset markets. The term 'efficient market' was initially applied to the stock market, but the concept was soon generalized to other asset markets. The efficient market hypothesis states that asset prices in financial markets should reflect all available information; as a consequence, prices should always be consistent with 'fundamentals'. In this paper, an attempt has been made to analyze the critical review of theory of Efficient Market Hypothesis and its implications for investment decision. The present study is entirely based on the availability and utilization of secondary data and literature. The study made use of various articles published in Journals and Newspapers of national repute. Some reputed handbooks related with finance are also be used. Our aim is to discuss the main ideas behind the hypothesis, and to provide a guide as to which of its predictions seem to be borne out by empirical evidence, and which do not. In examining the empirical evidence, we concentrate on the stock and foreign exchange markets, though much of the discussion is relevant to other asset markets, such as the bond and derivatives markets.

Keywords: Efficient market hypothesis, Filter point, asset markets fundamentals, Derivatives markets

### PAPER/ARTICLE INFO

RECEIVED ON: 01/11/2017

ACCEPTED ON: 17/12/2017

### Reference to this paper should be made as follows:

Anju Garg (2017), "Efficient Market Hypothesis: A Critical Review of Theory and Its Implications for Investment Decision", *Int. J. of Trade and Commerce-IIARTC*, Vol. 6, No. 2, pp. 405-413

## 1. INTRODUCTION

A generation ago, the efficient market hypothesis was widely accepted by academic financial economists; for example, see **Eugene Fama's (1970)** influential survey article, "Efficient Capital Markets". It was generally believed that securities markets were extremely efficient in reflecting information about individual stocks and about the stock market as a whole. The accepted view was that when information arises, the news spread very quickly and is incorporated into the prices of securities without delay. Thus, neither technical analysis, which is the study of past stock prices in an attempt to predict future prices, nor even fundamental analysis, which is the analysis of financial information such as company earnings and assets values to help investors select "undervalued" stocks, would enable an investor to achieve returns greater than those that could be obtained by holding a randomly selected portfolio of individual stocks, at least not with comparable risk.

The primary role of the capital market is allocation of ownership of the economy's capital stock. In general terms, the ideal is a market in which prices provide accurate signals for resource allocation: that is, a market in which firms can make production-investment decision, and investors can choose among the securities that represent ownership of firms activities under the assumption that security prices at any time "fully reflect" all available information. A market in which prices always "fully reflect" available information is called "efficient".

The efficient market hypothesis is associated with the idea of a "random walk" which is a term loosely used in the finance literature to characterize a price series where all subsequent price changes represent random departures from previous price. The logic of the random walk idea is that if the flow of information is unimpeded and information is immediately reflected in stock prices, then tomorrow's price change will reflect only tomorrow's news and will be independent of the price changes today. But news is by unpredictable and random. As a result, prices fully reflect all known information and even uniformed investors buying a diversified portfolio at the tableau of prices given by the market will obtain a rate of return as generous as that achieved by the experts.

## 2. EFFICIENT MARKET HYPOTHESIS (EMH)

Financial Markets are influenced by money flows and information flows. In free and highly competitive markets, demand and supply pressures determine the prices or interest rates. In a theoretical sense, markets are said to be efficient, if there is a free flow of information and market absorbs this information fully and quickly. James Lorie has defined the efficient security market as follows:

*"Efficiency...means the ability of the capital market to function so that prices of securities react rapidly to new information. Such efficiency will produce prices that are appropriate in terms of current knowledge, and investors will be less likely to make unwise investments."*

For the capital market efficiency theory to operate, the following assumptions are made:

1. Information is free and quick to flow.
2. All investors have the same access to information.
3. Transaction costs; taxes and any bottlenecks are not there and not hampering the free forces of market.

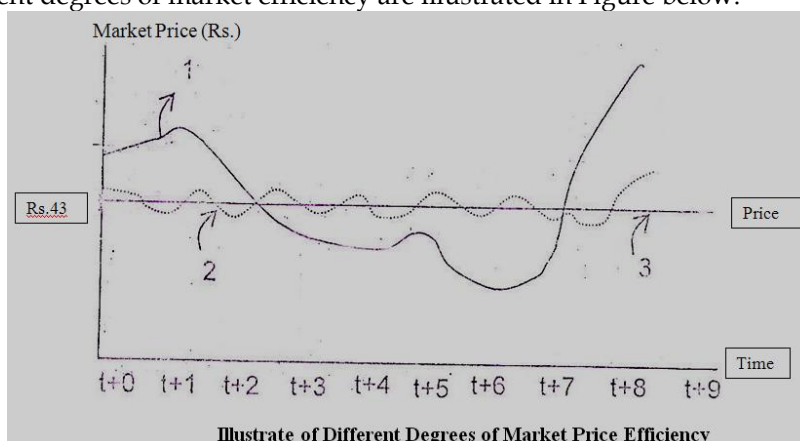
4. Investors are rational and behave in a cost effective competitive manner for optimization of returns.
5. Every investor has access to lending and borrowing at the same rate.
6. Market prices are not sticky and absorb the market information quickly and the market responds to new technology, new trends, changes in tastes, habits of consumers etc., efficiently and quickly.

### 3. TESTABLE EFFICIENT MARKET HYPOTHESIS

The tests make efficiency have been carried out for varying degrees of efficiency. The three popular hypotheses are:

1. **Weakly efficient market Hypotheses:** The weak form of the efficient market hypothesis is popularly known as the random-walk theory. The hypothesis is:  
"Past prices provide no information about future prices which would a short-term trader to earn a return above what could be attained with a naïve buy-and-hold strategy."
2. **Semi-strongly Efficient Market Hypothesis:** "Current prices of stocks not only reflect all informational content of historical prices but also reflect all publicly available knowledge about the corporation. However, even while correct adjustment takes place it will not be possible for analysts to obtain superior returns on a constant basis."
3. **Strongly Efficient Market Hypothesis:** This is to as perfectly efficient market theory.

The different degrees of market efficiency are illustrated in Figure below:



- (i) In weakly efficient market conditions the price value can be positive or negative and has larger variance.
- (ii) In semi-strong efficient markets, the variance is small.
- (iii) Perfectly efficient market prices are in continuous equilibrium. So that price equals value at every instance without variance.

### 4. EMPIRICAL TESTS

#### Weak Form

- (i) **Simulation Tests:** Harry Robert conducted simulation tests. He examined the appearance of the actual level of the Dow Jones Index expressed both in levels and in terms of weekly

changes and charted them. Then he generated a series of price changes from random-number tables and converted these changes into graphs. He compared the actual with the simulated ones.

- (ii) **Filter Rule:** To earn returns technical trading strategies based on historical prices have been used. Filter rule is one among such strategies. According to this strategy if a price of a security rises by at least  $x$  percent, investor should buy and hold the stock until its price declines by at least  $x$  percent from a subsequent high. Short sellers can use the filter to earn profits by liquidating their holdings when the price decreases from a peak level by  $x$  percent. They can take up short position as the price declines till the price reaches a new low and then increases by ' $x$ ' percentage. Different filter rules are used by different traders. It ranges from as small as 0.5 percent to as large as 50 percent.

The filter rule can be explained with the help of an example. Take a hypothetical company XY and assume the filter to be 10 percent. The price fluctuates between Rs. 20 to 30. Assume the starting point to be Rs. 20. When there is an increase in the price of the share to Rs. 22, i.e. (10 percent rise) one has to buy it. The rally may continue up to Rs. 30 and decline. If the price falls the sell signal is given at Rs. 27 i.e. 10% of Rs. 30 and the trader can take up the short position till it reaches its low level. When there is a rise in price the same exercises have to be followed. Several studies have found that after commissions the average gains produced by the filter rules were much below normal than the gains of the simple buy and hold strategy adopted by the investor.

- (iii) **Serial Correlation:** To test the independence between successive price changes serial correlation technique is used. Serial correlation or auto-correlation measures the correlation coefficient in a series of numbers with the lagging value of the same series. Price changes in period  $t+1$  (or  $t +$  any number) are correlated with the price changes of the preceding period. Scatter diagrams can be used to find out the correlation. If there is correlation between the price of  $t$  and  $t + 1$  period, the points plotted in the graph would form a straight line. If the price rise (or fall) in period  $t$  is followed by price rise (or fall) in period  $t + 1$  then the correlation co-efficient would be  $+1$ . But many studies conducted on the security price changes have failed to show any significant correlations. Fama computed serial correlations for 30 stocks for the period 1958-62 with varying  $t$  periods from  $t + 1$  to  $t + 10$ . The results of the autocorrelations were generally found to be insignificant, with most falling within the range of  $+0.10$  to  $-0.10$ . If there is little correlation between stocks price over time, chart analyses cannot be of much use in predicting the future.

**Semi Strong Form:** The tests aim at investigating:

- (i) Whether all publicly available information and news announcements (such as earning reports, changes in accounting information, stock splits, stock dividends and the like) are quickly and adequately reflected in stock prices.
- (ii) Whether analyst receiving such data is using successfully this information to obtain superior investment results.

The empirical studies conducted in this area are briefly reviewed here:

- (i) **Earnings Announcements: Ball and Brown** analyzed the effects of the annual earnings announcements made by 261 corporations over a 20 year period. They examined the stock

price, movements of companies that experienced “good” earning reports as opposed to the stock price movements of companies that experienced “bad” earnings reports. They found “good” earnings reports effected price rises and “bad” earnings reports effected price declines.

**Joy, Litzenberger and Mc. Enally** in their study tested the impact of quarterly earnings announcements of the stock price adjustment mechanism. They found that favorable information was not instantaneously reflected in stock prices.

(ii) **Discount Rate Changes:** Research into effects of discount rate changes has shown that the average security’s price changes a little before the announcement of discount rate changes. Such a change is not enough to yield a trading profit.

(iii) **Stock Splits:** Fama, Fisher Jensen and Roll tested the speed of market’s reaction to a firm’s announcement of a stock split and the accompanying information with respect to change in dividend policy. They obtained favorable findings to conclude that market was efficient.

The research has provided ample evidence in favor of the hypothesis. However, two anomalies in the hypothesis are noteworthy. They are:

- Price earnings ratio effect
- Size effect

**Strong Form:** Common sense is enough to refute the hypothesis. However, tests are conducted to find whether anyone having access to inside information has profited more. If the finding is positive, the hypothesis is disproved. We will examine to what extent specialists, insiders and professionals could profit from inside information:

(i) **Specialists:** Specialists on the organized security exchanges keep a book of unfilled limit orders to buy and sell at different prices. They have access to the valuable inside information and they use it to make speculative trading profit. Various studies, actions taken by the SEC (Securities and Exchange Commission) and court cases also suggest that some corporate insider are able to make profit from monopolistic access to information.

(ii) **Insiders:** Federal law in USA defines insiders as the directors, officers, significant shareholders or any other persons who have access to valuable inside information about at firm. Research had show that the rate of insiders trading profit is significantly above zero. But practically speaking the average insider certainly is not getting rich.

(iii) **Professionals:** The third group of people who would seem to be the next most likely to be able to have access to valuable inside information before it is fully publicized is mutual fund operator, A study of the performance of 18 mutual funds in USA for the decade 1951 to 1960 inclusive had shown that, on the average they did not earn returns for investors that a naïve investor could not attain at a less cost. Another study of 115 mutual funds over the decade from 1955 to 1964 showed similar findings.

**Filter Tests:** Filter tests are based on the principle of fixing a filter level varying from 0.5% to 5%, and then examine how well pick up both trends and reversals. Thus, if a stock moves up a filter point say 5%; then buy it and hold it long; when it reverses by the same filter point, 5%, sell it and take a short position in it. A short position is one where one sells even without holding shares to deliver. When the stock price reverses again at the filter point, cover the short position by buying the shares in the market. By this process, the contention of chartists that prices and volume data

of the past are supposed to tell the entire story and our approach is to forecast the trends and reversals only. Filtering is the screening of the important information affecting the prices from unimportant and sees how well the price changes pick up the trends and reversals. The results of tests conducted by Fama, Blume and Alexander on the basis of filter points also did not give conclusive proofs. If the filter level is low, the market swings capture these levels, but if the filter level is taken to be large, then results did not prove the hypothesis. Even in case of smaller filters, if transaction costs and other charges are taken into account the investors did not make profit by using the filter tests. In sum, the results of filter tests did not prove the chartist school's validity. Stock prices do not move in a predictable fashion of movement and reversals and one cannot make return in excess of the results warranted by the risks assumed by the investors. These results prove that the weak form of market efficiency holds good, as it is not possible to gain more from the price information of the market.

**Serial Correlation Tests:** Mr. Moore tested the movement of stock prices through serial correlation tests. Serial correlation is used to measure the extent of association of one series of security prices with a series in the past. Moore measures the correlation coefficient of price changes of one week with the price changes a week later and so on down the line. Its results showed that the correlation coefficient is very low indicating that a price rise did not show the tendency to the price fall and vice versa in any predictable manner. The price changes of this week do not therefore depend on the past price changes to any significant extent. Fama did the same correlation tests on daily price changes in 1965. He studied the companies included in the Dow Jones Industrial average for five years. His research showed low correlation and this proved that there is no significant relation between price changes in successive periods. Serial correlation or auto correlation of price data of different time periods did not show significant positive results. This proves that prices move in an independent fashion to a large extent.

**Run Tests:** A run is a set of consecutive price changes in the same direction. The time series data on price changes of stocks are used to test whether there are dependencies among these series in terms of signs and reversal of signs. Fama made Run Tests to examine whether the price changes were likely to be followed by further price changes in the same direction.

**Critical Review of EMH:** Opinion is divided as to the validity of the EMH particularly in the strong form. In weak form Random Walk hypothesis holds good, as per some studies. The semi strong form has found less support from the empirical studies. The perfect markets do not exist, as the stocks as a rule do not sell at the best price based on intrinsic values. Many times, speculative fervor sentiment and expectations play a greater role on the stock prices than the fundamental factors. Similarly news does not spread evenly among all segments of the market and among all investors. Institutional investors gain through market equity research and through economies of scale and better expertise. But individual investors do not gain by speedy spread of information and the absorption of the same by market. To gain, superior advantage, there was no adequate evidence from any of the empirical studies, based on prices or information. There is thus a controversy on the validity of Efficient Market Theory. In real market operations, this theory did not find support, as portfolio managers did not perform better based on the results of this theory. This theory posed a challenge to both the chartist school and the fundamentalist school. If Random Walk or Weak Market Efficiency holds good, chartist school finds that its tools

are not of real value to gain superior returns. Similarly if random walk holds good, following the study of fundamentals will not secure better returns, unless additional information and insights into the company or better insider knowledge are available to investors.

##### **5. IMPLICATIONS FOR INVESTMENT DECISION**

According to the efficient market hypothesis (EMH), only changes in fundamental factors, such as the outlook for margins, profits or dividends, ought to affect share prices beyond the short term, where random 'noise' in the system may prevail. (But this largely theoretic academic viewpoint – known as 'hard' EMH – also predicts that little or no trading should take place, contrary to fact, since prices are already at or near equilibrium, having priced in all public knowledge.) The 'hard' efficient-market hypothesis is sorely tested by such events as the stock market crash in 1987, when the Dow Jones index plummeted 22.6 percent – the largest-ever one-day fall in the United States. This event demonstrated that share prices can fall dramatically even though, to this day, it is impossible to fix a generally agreed upon definite cause: a thorough search failed to detect any 'reasonable' development that might have accounted for the crash. (But note that such events are predicted to occur strictly by chance, although very rarely.) It seems also to be the case more generally that many price movements (beyond that which are predicted to occur 'randomly') are not occasioned by new information; a study of the fifty largest one-day share price movements in the United States in the post-war period seems to confirm this.

However, a 'soft' EMH has emerged which does not require that prices remain at or near equilibrium, but only that market participants not be able to systematically profit from any momentary market 'inefficiencies'. Moreover, while EMH predicts that all price movement (in the absence of change in fundamental information) is random (i.e., non-trending), many studies have shown a marked tendency for the stock market to trend over time periods of weeks or longer. Various explanations for such large and apparently non-random price movements have been promulgated. For instance, some research has shown that changes in estimated risk, and the use of certain strategies, such as stop-loss limits and Value at Risk limits, theoretically could cause financial markets to overreact. But the best explanation seems to be that the distribution of stock market prices is non-Gaussian (in which case EMH, in any of its current forms, would not be strictly applicable).

Other research has shown that psychological factors may result in exaggerated (statistically anomalous) stock price movements (contrary to EMH which assumes such behaviors 'cancel out'). Psychological research has demonstrated that people are predisposed to 'seeing' patterns, and often will perceive a pattern in what is, in fact, just noise. (Something like seeing familiar shapes in clouds or ink blots.) In the present context this means that a succession of good news items about a company may lead investors to overreact positively (unjustifiably driving the price up). A period of good returns also boosts the investor's self-confidence, reducing his (psychological) risk threshold.

Another phenomenon – also from psychology – that works against an objective assessment is group thinking. As social animals, it is not easy to stick to an opinion that differs markedly from that of a majority of the group. An example with which one may be familiar is the reluctance to enter a restaurant that is empty; people generally prefer to have their opinion validated by those of others in the group.

In one paper the authors draw an analogy with gambling. In normal times the market behaves like a game of roulette; the probabilities are known and largely independent of the investment decisions of the different players. In times of market stress, however, the game becomes more like poker (herding behavior takes over). The players now must give heavy weight to the psychology of other investors and how they are likely to react psychologically.

The stock market, as any other business, is quite unforgiving of amateurs. Inexperienced investors rarely get the assistance and support they need. In the period running up to the 1987 crash, less than 1 percent of the analyst's recommendations had been to sell (and even during the 2000 - 2002 bear market, the average did not rise above 5%). In the run up to 2000, the media amplified the general euphoria, with reports of rapidly rising share prices and the notion that large sums of money could be quickly earned in the so-called new economy stock market. (And later amplified the gloom, which descended during the 2000 - 2002 bear market, so that by summer of 2002, predictions of a DOW average below 5000, was quite common.)

## 6. CONCLUDING REMARKS

It will thus be seen that the EMH in its strong form is not realistic in the actual markets. In India, in particular, despite all best efforts of SEBI, market prices are rigged up, and it is common to notice various price behavioral patterns and manipulation of prices. Information is costly and time consuming. No unqualified empirical support is found for efficient market hypothesis, even in its weakest form in India. In the case of institutional investors, equity market research is a tool used for forecasting prices and identification of undervalued scrip through fundamental analysis and determining the timings for purchase and sale by technical analysis. Although the followers of Technical or Chartist methods are very few in India, the major component of market research revolves around both fundamental and technical factors. In practice, therefore many of these theories, including the random walk theory are inapplicable to Indian conditions. Speculation is as high as 70-80% in Indian markets and markets are not perfect and the absorption of all types of information is also not timely and efficient. The investors in India go by research into fundamentals and select the scrip on the basis of their assessment of the extent of overvaluation and under valuation.

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