Chapter 2
Conceptual Aspects of Efficient Market Theory
- A Review
Chapter Two: Conceptual Aspects of Efficient Market Theory – A Review

In this section of the study, we shall try to analyze various conceptual aspects associated with information efficiency of stock markets with a detail coverage of the origin and history of the concept of market efficiency, its implications, conditions and last but not the least the controversies associated with it over the years. This analytical review is expected to provide us with sufficient theoretical basis to continue our search for the true level of information efficiency of Indian stock market.

2.1. Capital Market Efficiency; Alternative Concepts:

There are three alternative concepts of market efficiency namely Operational Efficiency, Allocation Efficiency and Information Efficiency.

- **Operational Efficiency:**
  Operational efficiency of capital markets refers to the cost-effectiveness of any transactions in securities on the exchange to its buyers and sellers. Hence an operationally efficient market carries out its operations at as low a cost as possible. This is promoted either by stimulating competition between market makers and brokers as much as possible, so that they can earn only normal profits or by enhancing competition between exchanges for secondary-market transactions.

- **Allocation Efficiency:**
  Society has a scarcity of resources and it is important that we find mechanisms, which allocate the resources to where they can be most productive. Thus industrial and commercial firms with the greatest potential to use invested fund effectively need a method to channel funds their way. Allocation efficiency of market ensures movement of funds to its most profitable use.

- **Pricing or Information Efficiency:**
  Pricing or information efficiency refers to the phenomena where asset prices move instantaneously and in an unbiased manner to any new information released in the market and hence the investor can expect to earn merely a risk adjusted return from an investment even after applying uniquely designed investment strategies.
The above alternative concepts of market efficiency are actually interrelated and hence improvement in any one ultimately leads to the development of the others and thereby enhances the overall efficiency of the market.

However, for the purpose of our study we shall mainly concentrate on the pricing or information efficiency of markets, a concept most interesting and ever debatable in the history of financial literature.

2.2. An Informationally Efficient Capital Market:

As mentioned earlier, an informationally efficient capital market is defined as one in which security prices always fully reflect all the available information regarding the securities traded. That is, in an informationally efficient capital market security prices will adjust instantaneously and in an unbiased manner to any new information becoming known to the market, thus leaving no scope for any market participant to earn above normal return on a consistent basis over a long period of time. To put it differently, in such an efficient market, the market price will be an unbiased estimate of the true (i.e. intrinsic) value of a security as any speculation based on any past, publicly available or private information will yield no good for an investor.

Since we have already mentioned that informational efficiency will remain the centre of our analysis, the rest of this study will use the term ‘efficiency’ or ‘efficient market’ to imply only ‘information efficiency’ or ‘informationally efficient markets’.

2.3. Origin and History of Efficient Market Theory:

The concept of market efficiency was first thought of by Bachelier (1900) in his dissertation to the Sorbonne for his PhD in mathematics submitted at the beginning of the previous century. Bachelier found that "past, present and even discounted future events are reflected in market price, but often show no apparent relation to price changes". This recognition of the informational efficiency of the market leads Bachelier to continue, in his opening paragraphs, that "if the market, in effect, does not predict its fluctuations, it does assess them as being more or less likely, and this likelihood can be evaluated mathematically". Sadly, Bachelier's contribution was overlooked. As a result what could have been an excellent theory on speculative markets was totally ignored. Rather research emphasis was shifted towards accumulating certain verities of empirical evidences that did not fit with the existing theories. Whereas Bachelier had concluded that commodity prices fluctuate randomly, later studies by Working (1934) and Cowles and Jones (1937) also showed that US stock prices and other
economic series also share random characteristics. But these observations were largely overlooked by researchers until the late 1950s.

In addition to these, there were other disturbing evidences about beating the securities market consistently. During 1930s Alfred Cowles III, founder of the Cowles Commission and benefactor of the Econometric Society, published, in an issue of *Econometrica*, a detail analysis of many thousands of stock selections made by investment professionals. Cowles (1933) found that there was no significant evidence of any ability of investors to outguess the market. Subsequently, Cowles (1944) provided corroborative results for a large number of forecasts over a much longer sample period. Hence by the end of 1940s, there was scattered evidence in favour of the weak and strong form efficiency of the market, though the terms were not in use at that time.

In 1953, Maurice Kendall, an eminent statistician, presented a somewhat unusual paper before the Royal Society of London. Kendall examined the behaviour of 22 U.K stock and commodity price series in search of regular cycles. Instead of discovering any regular price cycle, he found each series to be "a wandering one, almost as if once a week the Demon of Chance drew a random number ....and added it to the current price to determine the next week's price." In other words, prices appeared to follow a random walk, implying that successive price changes are independent of one another.

Regarding stock price behaviour only, H.V. Roberts (1959) was among the first to question the existence of systematic patterns in stock prices. Robert, in his well acclaimed paper 'Stock Market Patterns and Financial Analysis; Methodological Suggestion' (March 1959) demonstrated that a series of cumulative random numbers, which are obviously free from any systematic patterns, may closely resemble the actual stock price series but changes in the stock prices do not exhibit any pattern just like the changes in random numbers. He concluded that the 'patterns' observed in stock prices may be an illusory as those generated by random numbers and hence of no use for prediction. While explaining the implications of his paper he wrote, "the main reason for this paper is to call to the attention of financial analysts empirical results that seem to have been ignored in the past, for whatever reason, and to point out some methodological implications of these results for the study of securities."

Support was also there from another interesting study conducted by Osborn (Brownian Motion in Stock Market-March-April 1959), an eminent physicist who observed that US stock
price behaviour was similar to the movement of very small insoluble particles suspended in a liquid medium—known as 'Brownian Motion' in physics.

Despite the emerging evidence on the randomness of stock price changes, there were occasional instances of contrary price behaviour, where certain series appeared to follow predictable paths. This includes a subset of the stock and commodity price series examined by Working (1934), Cowles and Jones (1937) and Kendall (1953). These evidences eventually confused the researches to a great extent to provide any valid explanation to the contrary observations.

Finally in 1960, there was a realization that autocorrelation could be induced into returns series as a result of using time-averaged security prices. Working (1960) and Alexander (1961) independently discovered this. Once returns series are based on end-of-period prices, returns appear to fluctuate randomly. The problem of time-averaging identified by Working is the first research on thin trading.

Following this findings research works to identify random behavior of price series again got momentum. Especially during mid-1960s there was a turning point in research on the random character of stock prices. In 1964, Cootner published his collection of papers on that topic, while Fama's (1965) doctoral dissertation was reproduced, in its entirety, in the Journal of Business. Based on a thorough review of the existing literature on stock price behaviour and examinations on the distribution and serial dependence of stock market returns, he concludes that "it seems safe to say that this paper has presented strong and voluminous evidence in favour of the random walk hypothesis."

Furthermore, notable financial analysts like Granger and Morgenstern also provided substantial empirical support for the random walk phenomenon; using some statistical tests of dependence between successive stock price changes (e.g. Serial Correlation and Runs Test) they found generally insignificant departures from randomness. However it was Samuelson and Mandlebrat who first scientifically and rationally explained this random movement of stock prices and coined the concept RANDOM WALK HYPOTHESIS, which ultimately led to the development of "Efficient Market Theory".

Samuelson (1965) in his path breaking article "Proof That Properly Anticipated Prices Fluctuate Randomly", published in Industrial Management Review, opined that "in competitive markets there is a buyer for every seller. If one could be sure that a price would rise, it would
have already risen." Samuelson asserted that "arguments like this are used to deduce that competitive prices must display price changes... that perform a random walk with no predictable bias."

Based on Samuelson's work, together with the 'taxonomy of information sets' suggested by Harry Roberts (1967), Fama (1970) presented a comprehensive review of the theory and evidence of market efficiency. Though in his paper he attempted to proceed from theory to empirical work, he admitted that most of the empirical work preceded development of the theory. Fama (1970) also introduced the concept of three alternative levels of market efficiency namely Weak Form Efficiency (information set available is only historical stock price series), Semi-Strong Form of Efficiency (market reacts instantaneously to all publicly available information) and Strong Form Efficiency (market reacts instantaneously to all kind of information- public as well as private). He also pointed out three test criteria for testing market efficiency- tests for return predictability, event study and tests of private information. In addition, Fama (1970) summarized the early random walk literature, his own contributions and other studies of the information contained in the historical sequence of prices, and concluded that "the results are strongly in support" of the weak form of market efficiency. He then reviewed a considerable number of semi-strong and strong form tests, and concluded that "in short, the evidence in support of the efficient markets model is extensive, and (somewhat uniquely in economics) contradictory evidence is sparse."

Worthy to mention in this respect that the first event study on testing the semi-strong form of efficiency was taken up by Fama, Fisher, Jensen and Roll (1969), though the first to be published was by Ball and Brown (1968). Using the market model or CAPM, the event study provided evidence on the reaction of share prices to stock splits and earnings announcements respectively. In both cases, the market appeared to anticipate the information, and most of the price adjustment was complete before the event was revealed to the market. When news was released, the remaining price adjustment took place rapidly and accurately. These results were clearly in line with semi-strong form of efficiency.

Regarding strong form, the most talked about study was conducted by Jensen (1968) on fund managers' performance of 115 mutual funds over the period 1955-64. Jensen concludes that "on average the funds apparently were not quite successful enough in their trading activities to recoup even their brokerage expenses." This is a clear case of efficiency in strong form.
During the second half of 1970s research results started showing some anomalous behaviour in a few stock markets in some special situations that, clearly, were in against of ECMH. The January Effect (1976), The P/E ratios Effect (1977), The Monday Effect (1980) were some of such inconsistencies found in various developed stock markets around the world.

As a consequence researchers started re-evaluating the truth in EMH during 1980s. A huge number of studies reported significant departures from the theory. Lo and McKinlay (1988) found positive autocorrelations in small stocks. Conrad and Kaul also got the same results. French and Roll (1986) reported that, “stock prices are more variable when the markets are open”. DeBondt and Thaler (1985) and others found that there are large reversals in winners and losers. Shiller (1984) and Summer (1986) argued that “stock prices take large slowly decaying swings away from fundamental values, but short horizons... have little autocorrelations”. In addition a number of new market anomalies such as Small Firm Effect, S&P Index Effect, and The Weather Effect were also observed in various stock markets. Moreover testing excess volatility in stock markets was also started during this period. The results of this excess volatility have been confirmed by West (1988), Campbell and Shiller (1987), Mankiw, Romer and Shapiro (1985). There also evolved another interesting alternative concept Noise Trading during this period that says that investors trade on the basis of imperfect information and this will definitely cause prices to deviate from their equilibrium values. The main supporter of this Noise Trading was Shleifer and Summers (1990). However the supporters of EMH, Fama and French (1988), emphasized that irrational bubbles are indistinguishable from rational time-varying expected returns.

The studies denying EMH gained more momentum during 1990s and thereafter. Researchers, especially the behaviouralists developed human behaviour model on stock market reactions to price changes. Moreover the Great Crash of NYSE in 1987 fuelled such alternative theories to a great extent. The human behaviour says that most investors trade because of price change and not due to news about fundamentals. Hence even if information is disclosed in the market there may not be instantaneous adjustments in the stock prices due to this human expectation factor. As a result market will become predictable to some extent leaving some chance of making abnormal return from trading. Hirshleifer and Shumway (2001) found that sunshine is strongly correlated with daily stock returns. Grinblatt and Keloharju (2001) found that distance, language and culture influence stock traders.
During recent time also the research results are mixed. Though evidences on market efficiency are discernable in many stock markets across the world, contrary evidences are also not insignificant. However existence of at least weak form of efficiency cannot be ruled out in most developed and even a few emerging stock markets and this eventually confirms that the critics still have a lot to go to completely rule out the theory of market efficiency.

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2.4. A Few Misconceptions about Market Efficiency:

Due to the age-old concepts of trading based on analyzing the so-called "non-existent" dependence among the stock price changes, some people still carry some misconceptions in the mind regarding the proposition of Efficient Market Hypothesis. Here follows the answers for such misconceptions.

❖ Misconception: -
The Efficient Market Hypothesis implies that the market can forecast the future stock prices perfectly.

➢ Answer: -
The Efficient Market Hypothesis only implies that information will get impounded in stock prices instantaneously and in an unbiased manner. This does not mean that the market has perfect forecasting power.

❖ Misconception: -
Stock prices cannot deviate from true value.

➢ Answer: -
In fact there may be large deviations from the true value. The only requirement is that the errors in the market price should be unbiased. The prices may be greater than or less than the true value but the deviations must be unbiased.

❖ Misconception: -
As the prices tend to fluctuate they would not reflect fair value.

➢ Answer: -
The fact is, unless the price fluctuates, they would not reflect fair value. As the future is uncertain the market is continually surprised by the changes. When the prices reflect these surprises, they are bound to fluctuate. Hence fluctuation in prices rather reflects the fair value.

❖ Misconception: -
The random movement of stock prices suggests that the stock market is irrational.

➢ Answer: -
Randomness and irrationality are two completely different concepts. Rather, if investors are rational and competitive, price changes are bound to be random.

❖ Misconception: -
No investor will 'beat' the market in any time period.
To the contrary, approximately half of all the investors, prior to transaction cost, should ‘beat’ the market in any period.

- **Misconception:**
  No group of investors will ‘beat’ the market in the long run.

- **Answer:**
  Given the number of investors if we consider the probability, it would suggest that a fairly large number are going to beat the market consistently over long periods. But this is not because of their investment strategies, but because luck is on their side. It would, however, not be consistent if a disproportionally large number of these investors use the same investment strategy.

- **Misconception:**
  Inability of institutional portfolio managers to achieve superior investment performance would always mean that they are incompetent.

- **Answer:**
  If the market is efficient, it is ordinarily not possible to achieve above normal returns. Hence failure to achieve superior investment performance does not necessarily mean that they are incompetent, rather, market efficiency exists because portfolio managers are doing their job well in a competitive setting.

### 2.5. Conditions for Market Efficiency:

The theory on market efficiency essentially suggests that in an efficient market, security prices will adjust instantaneously and in an unbiased manner to any new information released to the market ruling out any possibility of earning any abnormal gain while trading in such securities. Therefore, the above feature of an efficient market can well be considered as the necessary condition for market efficiency. But there are other conditions also that leads to the instantaneous impoundment of information set available. They are the sufficient conditions for market efficiency. Let us analyze the conditions in detail.

- **Information Availability to Market Participants:**
  Any new information must be equally and instantaneously available and must be costless to all market participants in order for the capital market to be efficient. Such free flow of information ensures that strong competition prevails among investors and causes the prices to adjust instantaneously to such information. If any new information is costly to obtain and
once obtained is kept secret by a small group of investors, the prices will not fully and
instantaneously react to such information. On the contrary if such information is equally and
instantaneously available at free of cost, it will result in an instantaneous price adjustment
and an unbiased reflection of the new information into the security prices.

- **Homogeneous Expectation of Investors:**
  Another sufficient condition for capital market efficiency is that all investors must agree on
  the implications of available information for current prices and distribution of future prices of
each security. That is, only if the investors think alike about the implications of new
information for future cash flow streams of the business, that they will simultaneously take
prompt and similar action (buying and selling) regarding securities trading thereby resulting
in an instantaneous price adjustment to new information.

- **No Transaction Cost in Security Trading:**
  Since transaction cost involved in security trading (such as commission, brokerage, stamp
duties) inhibit the flow of transactions in securities, presence of such cost shall not result in
an instantaneous price adjustment and hence hamper efficiency in capital market.

- **Competitive activities of security analysts:**
  Many security analysts operate in the capital market to identify mispriced securities. Although each analyst may be individually engaged in an intensive examination of the
available information set, the large number of analysts examining the same set of information
increases the likelihood that more and more information shall be incorporated in security
prices. Although such analysts may make mistakes in their judgment or estimation, so long
such mistakes are independent across analysts, hey shall be diversified away in the price
determination process and hence shall not affect the incorporation of information in security
prices. Thus the larger the number of analysts operating in capital market and the lower the
correlation between their mistakes in estimation, the more efficient will be the capital market.

- **Size of the capital market:**
  In case of a large stock market such as New York Stock Exchange (NYSE) where large
numbers of individuals are willing to buy or sell quoted securities, no individual investor can
influence the market price of securities consistently and effectively in a deliberate way. As a
result prices will adjust in an unbiased manner to any new information in such a market.
Thus capital markets are efficient especially where the number of market participants making assessment about security prices is large.

- **Quantity and Quality of information disclosed by firms:**
  Extensive disclosure of information is another pre-requisite to capital market efficiency because adequate disclosure of information minimizes the ignorance in the capital market and hence causes the prices to fully reflect the information relevant for formation of such prices. That is, the more visible a company is, the more likely that all the factors affecting security prices are known to the market. Conversely the less visible a company is, the less likely that the market price of its shares will fully reflect the factors affecting such prices.

- **Continuous equilibrium prevails:**
  That is, the security's price and value move together over time and so are continuously equal. The equilibrium is not static but changes constantly as new information enter the marketplace. Each time the latest piece of news is released, the intrinsic value of securities will change, and the market price will change accordingly – they will move towards the new value.

  The above conditions, however, are not always rational; transaction costs do exist in capital market, information is obviously not freely and equally available to all participants and investors do have differential expectation regarding stock price movement. As a result, critics raise serious questions as to the feasibility of efficient markets in practice.

  But Fama argued that, in spite of the above conditions not being met in the real capital markets, the actual capital markets can still be reasonably efficient because these conditions are sufficient but not necessary for market efficiency i.e. even if there is positive information processing cost and transaction cost in the capital market and the investors expect heterogeneously about the implications of new information, capital markets can still be efficient when transactions do take place.

**2.6. Forms of Market Efficiency:**

Depending upon the information set that is fully reflected in security prices, Eugene Fama (1970) classified efficient capital markets into the following three forms:
a) **Weak Form Efficiency:**
The information set available in such a market is past sequence of security prices. Since past price data cannot be used to predict future security prices as these are already impounded in the stock prices, evidences on random walk hypothesis (i.e. independence of successive price changes) would generally confirm the weak form of efficiency in capital markets.

b) **Semi-strong Form Efficiency:**
The semi-strong form of efficient capital market hypothesis says that stock prices adjust to all information, both past information and also all other publicly available information such as annual earnings announcements, stock splits, interim dividend etc. This implies that using publicly available information investors will not be able to earn superior risk adjusted returns.

c) **Strong Form Efficiency:**
The information set available in such a market is all information both publicly available as well as inside information and a strong form of efficiency will imply that the stock price will incorporate all those information.

Since different forms or levels of efficiency require progressively more amount of information impoundment, various customized test techniques are applied to confirm such forms.

2.7. **Tests on Market Efficiency:**

- **Weak form efficiency tests:**
Since in a weak form efficient market past price information should not be useful in predicting the future movements in security prices, independence of successive price changes or random walk (and consequently failure of systematic trading tools to earn consistent above normal return) is the basis for the tests on weak form efficiency. The tests which are used to assess weak form efficiency include the following.

  - **Traditional Test Techniques:**
    They include Parametric Serial Correlation Coefficient Test and Non-parametric Run Test to test successive dependence and Filter Rule test to test the performance of systematic trading strategies.

    The serial correlation (also called Auto-correlation) measures the correlation between price changes in consecutive-time periods whether hourly, daily or weekly and is a measure of how much the price change in any period depends upon the price change over the previous period.
Hence a price change that is non-zero and statistically significant would imply that returns in a period are more likely to depend on the prior period’s returns.

Under **Run Test**, a run occurs when there is no difference between the sign of two changes. To test a series of price changes for independence the number of runs in that series is compared to see whether it is statistically different from the number of runs expected in a purely random series of the same size. Thus existence of inefficiency is indicated by a test statistic value higher than the critical value.

Along with **Serial Correlation Coefficient Test**, another test on Serial Correlation that is used frequently is **Box-Pierce Q statistic** and a relatively better version of the same for small sample known as **Ljung-Box Q statistic** which tests the joint hypothesis that all autocorrelations are simultaneously equal to zero. Hence a significant Q statistic would imply that price changes up to a certain lag are correlated.

Under **Filter Rule Test**, an n % filter rule may be defined as follows: If the closing price of a particular stock increases by at least n%, buy the stock and hold until the price decreases by at least n % from the highest price following the purchase. At this time simultaneously sell the holding and go short. Maintain the short position until the daily closing price rises at least n % above a subsequent low. At this point of time cover the short position and go long. Price movements of less than n % in either direction should be ignored. Obviously the use of a filter rule will be profitable only when successive price changes are dependent.

**Advanced Test Techniques:**

Apart from the traditional tests mentioned earlier, recent research studies used a few advanced tests to assess random behaviour of security prices. These are the **tests of stationarity** and mainly include **Unit Root Tests**. Unit Root Tests are statistically more advanced and sound. Under a unit root test, we test a given time series for existence of a unit root. Existence of unit root would simply mean that the time series is non-stationary, that is, its statistical properties such as mean, variance, autocorrelation, etc. are not constant over time. Thus a non-stationary time series will follow the random walk and would be consistent with the assumption of weak form of market efficiency. There are a number of unit root tests available- of them **ADF** (Augmented Dicky Fuller test) and **PP** (Philips Parron Tests) are the most popular in these type of research studies.
In addition to the tests on stationarity, recent studies in this field have also used **advanced modeling techniques** to model and thereby predict the future price movements based on the lagged movements of prices. Since, the price changes in a weak form efficient market should not be predicted effectively, existence of statistically significant coefficients would imply that past changes are really useful to predict future changes, thereby refuting the possibility of any weak form characteristics. These techniques include **Auto Regressive models, ARIMA** (for non-stationary process) and **ARMA** (for stationary process), **ARCH** (Auto Regressive and Conditional Heteroscedastic) models and **GARCH** (Generalized ARCH) models with many possible variations to suit the return series.

- **Semi-strong Form Efficiency Tests:**

  As mentioned earlier, in a semi-strong form of efficient capital market security prices adjust to all information, both past information and also all other publicly available information such as annual earnings announcements, stock splits, large secondary offering of common stocks, new issues of stocks, interim dividend etc. Thus this form of efficiency essentially rules out any scope for the investors to earn superior risk adjusted returns. To assess whether the security market is efficient in the semi-strong form two test techniques are generally used-Event Study and Portfolio Study.

  An **Event Study** examines the market reactions to and the excess market returns around a specific information event like acquisition announcement or stock split etc. Thus, if it is found that there is statistically significant excess return on and around the information event existence of semi-strong form of efficiency is evident.

  In a **Portfolio Study**, a portfolio of stocks having an observable characteristic (low price-earnings ratio or whatever) is created and tracked over time see whether it earns superior risk-adjusted returns as compared to the market portfolio. Now, if it is found that the portfolio has managed to earn statistically significant excess return, it will confirm existence of semi-strong form of efficiency in the market.

- **Strong Form Efficiency Tests:**

  Since in a strong-form efficient market security prices are likely to instantaneously incorporate all information both publicly available as well as inside information, scope of
earning any abnormal return by the investors by exploiting such information can be a good indicator of existence of strong form efficiency.

Inside information is normally available with the company managers and top officials. But they cannot officially engage in trading in their own securities. Excluding this group large broker houses and large mutual fund managers sometimes with huge money at their disposal, efficient network and superior analytical skills these groups are expected to earn some hidden information about the company. Thus if it is found that these two groups can consistently manage to earn superior return as compared to retail investors that will evident strong form inefficiency of the market.

Diagram 2A: Tests on Market Efficiency- At a Glance
2.8. Evidence against EMH- Alternative Theories of Market Behaviour:

Though in an efficient market, security prices must adjust instantaneously to any new information placed in the public domain thereby leaving no scope for investors to earn above normal returns with the help of systematic trading strategies based on the information set just arrived, a considerable number of research studies in diverse fields have reported evidences not consistent with this proposition of efficient market theory. Such inconsistencies have been termed as “Efficient Capital Market Anomalies”. These anomalies clearly indicate that the hypothesis of market efficiency surely has certain pitfalls and this has led the researchers to find out an alternative explanation to EMH.

**Efficient Capital Market Anomalies:**

EMH became controversial especially after the detection of certain anomalies during 1970s and as the studies in this respect progress the list is getting longer. Some of the main anomalies that have been identified so far are as follows.

**A. The January Effect:**

A common empirical finding across many stock exchanges of the world is that the capital markets performs relatively well during the month of January in comparison to the remaining eleven months.

Rozeff and Kinney (1976) were the first to document evidence of higher mean returns in January as compared to other months. Using NYSE stocks for the period 1904-1974, they find that the average return for the month of January was 3.48 percent as compared to only 2 percent for the other months. Subsequently research studies conducted in European, Japanese and Singaporean stock market also provided the evidence of existence of January effect, e.g. Gultekin and Gultekin (1983), Chang and Pinegar (1986). Dhillon and Ramirez (1999) document a November effect, which is observed only after the Tax Reform Act of 1986. They also found that the January effect is stronger since 1986. Studies have documented that the effect persists in more recent years: e.g. Bhardwaj and Brook (1992) for 1977-1986 and Eleswarapu and Reinganum (1993). Studies have also shown that the mean returns in January exceed those in each of the other eleven months for small size firms' category.

**B. The Weekend Effect (or Monday Effect):**

French (1980) analyzed daily returns of stocks for the period 1953-1977 and finds that there is a tendency for returns to be negative on Mondays whereas they are positive on the other days.
of the week. He said that these negative returns are "caused only by the weekend effect and not by a general closed-market effect and thus a trading strategy, which would be profitable in this case, would be to buy stocks on Monday and sell them on Friday". Subsequently this phenomenon has been observed in U.K, Canadian, French, Australian, Japanese and Singaporean stock markets. Research results have also indicated that the Monday effect, like the January effect, is more prominent for small size firms. However some recent studies have generated some facts contrary to Monday effect. Kamara (1997) showed that S&P 500 has no significant Monday effect after April 1982, yet he found the Monday effect undiminished from 1962-1993 for a portfolio of smaller U.S stocks. Internationally, Agarwal and Tandon (1994) found significantly negative returns on Monday in nine countries and on Tuesday in eight countries, yet large and positive returns on Friday in 17 of the 18 countries studied. However their data do not extend beyond 1987. Steeley (2001) found that the weekend effect in UK has disappeared in the 1990s.

C. Other Seasonal Effects:

Holiday and turn of the month effects have been well documented over time and across countries. Lakonishok and Smidt (1988) show that U.S stock returns are significantly higher at the turn of the month, defined as the last and first three days of the month. Ariel (1987) showed that returns tend to be higher on the last day of the month. Cadsby and Ratner (1992) found similar turn of the month effects in some countries. Ziemba (1991) found evidence of a turn of the month effect for Japan when turn of the month is defined as the last five and first two trading days of the month. Hansel and Ziemba (1996) and Kunkel and Compton (1998) showed how abnormal returns could be earned by exploiting this anomaly. Lakonishok and Smidt (1988), Ariel (1990) and Cadsby and Ratner (1992) all provide evidence to show this for countries other than the U.S. Brockman and Michayluk (1998) describe the pre-holiday effect as one of the oldest and most consistent of all seasonal regulation.

D. Small Firm Effect:

It has been observed in many capital markets that smaller companies (measured by total capital or total market capitalization) tend to outperform larger companies and also the market, even when returns are adjusted for risk. This suggests that investing in small firm size portfolios would be sound investment strategy. Such a result is in contravention of ECMH because it should not have been possible to discriminate between securities of various firms and earn...
abnormal return on the basis of a publicly observable variable had the capital market been efficient in nature.

Benz (1981), in this respect, published one of the earliest articles on the small-firm effect that is also known as the ‘size effect’. His analysis of the 1936-1975 periods reveals that excess returns would have been earned by holding stocks of low capitalization companies. Supporting evidence is provided by Reinganum (1981) who reported that the risk adjusted annual return of small firms was greater than 20 percent. If the market were efficient, one would expect the prices of stocks of these companies to go up to a level where the risk adjusted returns to future investors would be normal. But this did not happen.

E. P/E Ratio Effect:

Sanjoy Basu (1977) shows that stocks of companies with low P/E ratios earned a premium for investors during the period 1957-1971. An investor who held the low P/E ratio portfolio earned higher returns than an investor who held the entire sample of stocks. These results also contradict EMH. Campbell and Shiller (1988) show P/E ratios have reliable forecast power. Fama and French (1995) found that market and size factors in earnings help explain market and size factors in returns. Dechow, Hutton, Meulbroek and Sloan (2001) documented that short-sellers position themselves in stocks of firms with low earnings to price ratios since they are known to have lower future returns.

F. Value Line Enigma:

The value line organization divides the firms into five categories and ranks them according to their estimated performance based on publicly available information. Over a five-year period starting from 1965, returns to investors correspond to the rankings given to firms. That is, higher-ranking firms earned higher returns. Several researchers (e.g. Stickel, 1985) find positive risk-adjusted abnormal returns using value line rankings to form trading strategies, thus challenging the EMH.

G. Standard and Poor’s (S&P) Index Effect:

Harris and Gurel (1986) and Shleifer (1986) found a surprising increase in share prices (up to 3 percent) on the announcement of a stock’s inclusion into the S&P 500 index. Since in an efficient market only information should change prices, the positive stock price reaction appears
to be contrary to the EMH because there is no new information about the firm other than its inclusion in the index.

**H. Book to Market Ratio:**

Fama and French (1992) found that the book to market ratio is a strong predictor of a firm’s future mean returns. They observed that firms with higher book to market ratio outperform those firms with lower ratio thereby suggesting that investing in firms with higher ratios would be a profitable investment strategy.

**I. Post Announcement Drift:**

As per the ECMH, the price adjustment, in an efficient capital market, is instantaneous to any new information. That is, say, once earnings releases are made, it shall not be possible to develop a profitable trading strategy based on the magnitude of unexpected earnings. But empirical evidences suggest that price changes persist for some time even after the initial announcement. Some research studies have also indicated that the post-announcement drift is more prominent for small size firms. But the post announcement drift contradicts the ECMH in the sense that in an efficient capital market, security prices should instantaneously incorporate information in an earnings release at the time of its public release.

**J. Over/Under Reaction of Stock Prices to Earnings Announcement:**

There is substantial documented evidence on both over and under-reaction to earnings announcements. DeBondt and Thaler (1985, 1987) presented evidence that was consistent with stock prices over reacting to current changes in earnings. They reported positive (negative) estimated abnormal stock returns for portfolios that previously generated inferior (superior) stock price and earning performance. This could be construed as the prior period stock price behaviour overreacting to earnings developments (Bernard, 1993). Such interpretation has been challenged by Zarowin (1989) but is supported by DeBondt and Thaler (1990). Bernard (1993) provided evidence that was consistent with the initial reaction being too small, and being completed over a period of at least six months. Ou and Penman (1989) also argued that the market underutilizes financial statement information. Bernard (1993) further noted that such anomalies were not due to research design flaws, inappropriate adjustment for risk or transaction costs. Thus the evidence suggests that information is not impounded in prices instantaneously as the EMH would predict.
K. The Briloff Effect:

Given the conditions for capital market efficiency (i.e. information is available cost free to all market participants), there should be no reaction to releases made by intermediaries who restrict their activities to re-statement of information already available at no cost to all market participants. But the empirical evidences suggest otherwise.

Prof. Abraham Briloff, a noted critic of contemporary financial reporting standards, accounting method choices, business judgment made by management, management integrity etc. has periodically criticized the financial reporting practices of firms in his research based articles published in “BARRONS” using his superior accounting knowledge and analytical insights. He hypothesized that the market accessed information on any financial variable at face value without any consideration as to how it is computed. As a result common stock of firms criticized by Briloff typically suffer large price drop following his publication and the price drop appeared to be a permanent one.

L. The Weather:

Few would argue that sunshine puts people in a good mood. People in good moods make more optimistic choices and judgments. Saunders (1993) showed that the NYSE index tends to be negative when it is cloudy. More recently, Hirshleifer and Shumway (2001) analyzed data for 26 countries from 1982-1997 and found that stock market returns are correlated with sunshine in almost all of the countries studied. Interestingly, they found that snow and rain have no predictive power.

The above anomalies of efficient market behaviour have led researchers to question the EMH and to investigate alternative theories of market behaviour.

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<th>No</th>
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<td>A.</td>
<td>The January Effect</td>
<td>Rozeff and Kinney</td>
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<td>B.</td>
<td>The Monday Effect</td>
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<td>Other Seasonal Effect</td>
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<td>D.</td>
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Given the above limitations of the concept of market efficiency, a group of finance scholars known as behaviouralists have proposed an alternative approach to the efficient market hypothesis based on a number of observed phenomena of the trading behavior of investors. These have been discussed in brief as follows:

1. Volatility Tests:

In an attempt to find an alternative to EMH, the greatest stir has been created by the results of volatility tests. These tests are designed to test for rationality of market behaviour by examining the volatility of share prices relative to the volatility of fundamental variables that affect share prices. The first two studies applying these tests were by Shiller (1981) and LeRoy and Porter (1981). Shiller tests a model in which stock prices are the present discounted value of future dividends. LeRoy and Porter use a similar analysis for the bond market. These studies reveal significant volatility in both the markets. Shiller concluded that fluctuations in actual prices greater than those implied by changes in the fundamental variables affecting the prices are the result of fads or waves of optimistic or pessimistic market psychology. Schwert (1989), in his attempt to establish a relation between stocks return volatility and economic activity, finds increased volatility in financial assets returns during recessions that might suggest that operating leverage increases during recessions. He also finds increased volatility in periods where the proportion of new debt issues to new equity issues is larger than a firm’s existing capital structure. This may be interpreted as evidence of financial leverage affecting volatility. However neither of these factors plays a dominant role in explaining the time-varying volatility of the stock market. The volatility tests of Shiller spawned a series of articles. The results of excess volatility in the stock market have been confirmed by Cochrane (1991), West (1988), Campbell and Shiller (1987), Mankiw, Romer and Shapiro (1985). The tests have been criticized, largely...

The empirical evidence provided by volatility tests suggest that movements in stock prices cannot be attributed merely to the rational expectations of investors, but also involves an irrational component. This irrational behaviour of the investors has been emphasized in the concept of 'noise trading'.

II. Noise Trading and Arbitrageurs:

Shleifer and Summers (1990) said that there are two types of investors in the market—Rational speculators or arbitrageurs who trade on the basis of information and Noise traders who are not rational as their demand for risky securities is influenced by beliefs or sentiments that are not fully supported by fundamentals.

a. Noise Trading:

Many investors trade on signals, or noise, and not on fundamentals. They are called Noise Traders. As long as these investors trade randomly, their trades can cancel out and are likely to have no perceptible impact on demand. However, this happens only to some extent because noise traders employ similar strategies as they suffer from similar judgmental basis while processing information. For example:

- They tend to be overconfident and hence assume more risk.
- They tend to extrapolate past time series and hence chase trends.
- They tend to put lesser weight on the base rates and more weight on new information and hence overreact to news.
- They follow market gurus and forecast and act in a similar fashion.

Given the correlated behaviour of noise traders their actions lead to aggregate shifts in demand.

b. Limits to Arbitrage:

It can be expected that the irrationality of 'noise traders' may be countered easily by the rationality of 'arbitrageurs' because arbitrageurs are supposed to be guided by fundamentals and are not reactive to sentiments. However arbitrage opportunities are limited in the real world because of two risks— the risk of market falling further after buying an ‘undervalued’ stock and resale price risk. As a result of the former risk arbitrageurs may restrain from taking large long positions which could restore price fully to fundamentals. The second risk is however more significant because firstly Arbitrageurs usually borrow money or securities to implement their
trades, and, therefore, have to consider fees periodically. So they cannot keep an open position for long and secondly, Portfolio managers are evaluated every few months. This also limits their horizon of arbitrage.

Given the substantial presence of noise traders whose behaviour is correlated and the limits to arbitrage, investor sentiment does influence prices. In such a market, prices often vary more than what is warranted by changes in fundamentals. Moreover, arbitrageurs may also contribute to price volatility as they always try to take advantage of the mood swings of noise traders.

Given such actions of noise traders and arbitrageurs, one would expect the following:

- Returns over horizons of few weeks or months would be positively correlated because of positive feedback trading, and
- Returns over horizons of few years would be negatively correlated because arbitrageurs eventually help prices to return to fundamentals.

This implies that returns tend to be mean reverting that simply goes in contrast with EMH.

**III. Models of Human Behaviour:**

In a market consisting of human beings, it seems logical that explanations rooted in human and social psychology would hold great promise in advancing our understanding of stock market behaviour. More recent research has attempted to explain the persistence of anomalies by adopting a psychological perspective. Evidence in the psychology literature reveals that individuals have limited information processing capabilities, exhibit systematic bias in processing information, are prone to making mistakes, and often tend to rely on the opinion of others.

Among the behaviouralists, Kahneman and Tversky (1986) were among the first to criticize the assumption of human rationality in their highly acclaimed study on prospect theory. In their paper, Kahneman and Tversky, questioned the expected utility theory which is used more often than anything in financial literature while explaining human decisions in financial arena and opined that when faced with the complex task of assigning probabilities to uncertain outcomes, individuals often tend to use cognitive heuristics. Using simple decision tasks, they demonstrated that instead of evaluating alternatives in terms of the impact on these alternatives on their final wealth position as assumed under expected utility theory, individuals tend to evaluate the situation of gains and losses relative to some reference point and thus strongly violets expected utility theory. Rabin and Thaler (2001) also found similar results in their study and concluded
that expected utility theory’s explanation of risk aversion is not tenable in all cases. This is because the theory largely fails to recognize the psychological principals governing decision tasks.

Coming to investors’ behaviour in the stock market, it is possible to use the framework provided by studies on cognitive psychology to explain some of the persistent anomalous findings. For example, the observation of overreaction is consistent with the finding that subjects, in general, tend to overreact to new information. Similarly individuals sometimes base their decisions on some irrelevant points of reference, a situation explained under the concept “anchoring an adjustment”. Shiller (1984), while explaining the movements in stock prices, suggested that the final opinion of individual investors may largely reflect the opinion of a larger group. Thus, excessive volatility in the stock market is very often attributed to social “fads”.

Hirshleifer and Shumway (2001) find that even sunshine (i.e. weather) is strongly correlated with daily stock returns. Using a unique data set of two years of investor behaviour for almost the entire set of investors from Finland, Grinblatt and Keloharju (2001) find that distance, language, and culture influence stock trades.

Summers (1986) also challenged the claim of the supporters of efficient market that prices represent rational valuation of fundamental factors. He suggested that pricing should comprise a random walk plus a fad variable, as a slowly mean-reverting stationary process, that is to say, stock prices will exercise some temporary aberrations, but will eventually return to their equilibrium price levels.

Some supporters of efficient market argue that market mechanisms may be able to correct the individual decision biases as stock price movements are the results of aggregate decisions and not decisions of any individual, and thus individual differences may not persist ultimately. However, the transition from micro behaviour to macro behaviour is still not well established.

All argument aside, the stock market crash of 1987 continues to be problematic for the supporters of EMH. The theoretical framework of EMH failed to a large extent to explain such a huge decline in the stock prices. It provides further evidence that the market includes a significant number of speculative investors who are guided by “non-fundamental” factors. Thus, the assumption of rationality in conventional models needs to be rethought and reformulated to conform to reality.
2.9. The Supremacy of EMH:

It is true that in the recent years many empirical research findings have put a direct challenge for EMH. However those results are yet to rule out EMH completely. Anomalous behaviour of stock prices has many explanations, irrational behaviour of investors is difficult to generalize and human behaviour models are yet to develop to a standard. The following discussion is therefore aimed at reestablishing the supremacy of ECMH.

**Critical Analysis of Efficient Capital Market Anomalies:**

The supporters of efficient market hypothesis have put forward a number of explanations for market anomalies.

- In respect to 'January effect' or 'Monday effect' it has been argued that a systematic movement in stock prices during the turn of the year (in case of January effect) or of the trading week (in case of Monday effect) does not necessarily mean that investors are not aware of this phenomenon. Therefore these effects do not invalidate the core theme of efficient market theory that states that share price adjust rapidly and instantaneously in the market in response to new information release, leaving no scope for any supernormal gain or loss.

- Regarding 'Size Effect' it can be said that general investors usually show less interest in the performance of small size firms and therefore there is every possibility of such firms to be under-researched. Therefore in certain cases some information regarding small size firms may not get reflected in the stock prices instantaneously lading to a gradual incorporation of information and a fair degree of predictability.

- 'Post Announcement Drift' actually relates to small size firms. A large size firm with substantial amount of institutional holding seldom shows the post announcement drift.

- Regarding 'Briloff Effect' and 'Value Line Ranking' it is argued that:
  a. Both Briloff and Value line investment services had exceptional skills and knowledge to find and also analyze certain valuable information from the published financial statements that the general investors and analysts with average skill or knowledge often fail to explore.
  b. It is also possible that due to their superior network and influence they may possess certain inside information that would otherwise not be available at all to the general investors and analysts.
Thus the above two factors are only the exceptions to the rule and therefore do not in any way invalidate the efficient market theory; especially the weak and semi-strong form of efficiency.

- Regarding overreaction in the market it is again established that market reacts in an aggressive way only in a few cases. Therefore this cannot be taken as a general rule, these are mere exceptions. Again the effect of such overreaction is very short-lived, which, in a sense validate the efficient market theory.

At the end it can be said that anomalies, though suggest some element of inefficiency and hence predictability in the market, they are yet to be considered as a general rule. They are rather exceptions—either because of personal buying patterns or because of any hidden information difficult to hunt by the general investors without superior analytical tools and knowledge.

**Critical Analysis of Noise Trading, Fads, Arbitrage:**

It is true that in the recent past many research studies have reported some element of inefficiency in the markets due to Noise Trading, Fads or Arbitrage, but the question is how far the assumption ‘investors are not necessarily rational and their behaviour are correlated’ is true? Whether a few investors with that kind of behaviour can really make any significant impact on stock prices? What is the role of large institutional investors in this regard?

All the above questions are yet to be resolved and till then EMH is holds its flag up.

**Critical Analysis of Human Behaviour Models:**

There is no doubt that the human behaviour models have directed a new path for researches on market efficiency. It has empirically established that rational behaviour from the investors cannot be expected all the time and hence such unpredictable behaviour may, in some cases, lead to certain inefficiency element in the market. But again the question is whether such inefficiency occurs always specially in a market with large players? Can the models really suggest any better way to explain the individual behaviour?

Until this happens EMH cannot be ruled out completely.

Thus, despite the anomalies and puzzles and the challenge of behaviouralists and other critics, the substantial evidence in favour of the efficient market hypothesis cannot be ruled out completely.
The supporters of market efficiency argue that it is not at all surprising that several anomalies and puzzles have been discovered. When data is used extensively, one is bound to find a no of patterns. As Bradford Cornell puts it: “Even a set of random numbers generated by a computer will appear to have some pattern after the fact. Those patterns, however, are spurious and will not be replicated in another generation of random numbers. Many scholars feel that the same is true of stock prices”. William Sharpe puts it more vividly: “If you torture the data long enough it will confess you any crime”.

Moreover even if inefficiency exist, it is difficult to take advantage of them. As Richard Roll says: “Over the past decade, I have attempted to exploit many of the seemingly most promising ‘inefficiencies’ by actually trading significant amounts of money according to a trading rule suggested by the ‘inefficiencies’ ....I have never yet found one that worked in practice, in the sense that it returned more after cost than a buy-and-hold strategy”.

It is true that, like all theories, efficient market hypothesis is also cannot perhaps explain stock price behaviour always. However, there does not, at least for the present, seem to be a better alternative. As Morton said “The failure of so many successive attempts to reject the efficient market hypothesis in a simple and decisive test has led some to believe that perhaps it can’t be done. The hypothesis is simply too broad and too flexible (and has too much of truth in it) to fall in a single blow. It is closer to being a ‘paradigm’ than a mere hypothesis, bringing a common and coherent explanatory framework to a wide variety of seemingly unrelated phenomena. Like all scientific paradigms, it will survive until displaced by a better one. At the moment, at least, no better paradigm is in site”.

2.10. Implications of Market Efficiency:

It is true that the ongoing research activities have cast a shadow over the validity of ‘Efficient Market Hypothesis’, but still it cannot be rejected outright, rather the supporters have strongly advocated that those imperfections have some specific explanations and cannot be generalized so easily. Hence there is still a long way to go to dethrone EMH from its supremacy. Hence EMH is still very much relevant. With this we shall now concentrate on the implications of ‘Efficient Capital Markets’.

The concept of market efficiency is useful in different contexts.
a) An Analyst's Perspective-
- If the market is efficient in the weak form, technical analysis based on the chartist techniques is completely useless and any strategy based on past price series is rather wastage of time.
- If the market is efficient in the semi-strong form, trading strategies based on even publicly available price sensitive information will yield no excess return.

b) An Investor's Perspective:
- For the vast majority of people public information cannot be used to earn abnormal returns in a semi-strong efficient market. Therefore, so long the efficiency is maintained an average investor should simply select a suitably diversified-portfolio, thereby avoiding costs of analysis and transactions.
- Retail investors should always demand for more and more information from the companies and therefore put pressure on the accounting bodies and other regulatory agencies to ensure greater disclosure by corporate. This disclosure and consequent instantaneous incorporation of published information will bring the actual price to what it should be.

c) A Corporate Manager's Perspective:
- Companies frequently repurchase their own stock because they feel it has been undervalued by the market. If the market is strong form efficient, this rationale is not tenable at all.
- The investment decisions of the managers of business firms are based to a large extent on signals they get from the capital market. If the market is efficient, the cost of obtaining capital will accurately reflect the prospects for each firm.
- Managers sometimes express concern over the effect that a change in accounting procedure will have on reported earnings per share. If the market is semi-strong form efficient, they should not be concerned. Informed, rational analysts will adjust for different accounting procedures used by different firms and assess prospects on the basis of standardized numbers. Thus adjustments in accounting technique will have no effect on the price of the firm's equity.
- Managers sometimes resort to creative accounting to show a more impressive performance than is justified and thinks that they can fool investors through such tricks. If the market is efficient, most of the time these tricks are transparent to the investors who are alert to adjust for the real position and security prices do not rise artificially.
• Managers sometimes delay issue of shares of their company as they feel that their shares are currently under priced because the market is low. If the market is efficient the shares are already correctly priced and it is just like that the next move in prices will be down as up. Thus, if the market is efficient the timing of security issues does not have to be fine-tuned.

d) Societal Perspective:
• A necessary condition for optimal resource allocation, in a capital market, is that market prices always provide accurate signals for investor choices. This will be the case when security prices fully reflect all publicly available information relevant to the prediction of future outcomes (e.g. dividend payments, price changes etc.) capital in such a market, will continuously flow to the most profitable investments resulting in an optimal resource allocation.

All the above implications of the concept of market efficiency clearly indicate its immense application by various parties in their attempts to predict the market movements to meet their varied objectives.