

The Efficient Market Hypothesis and Human Irrationality

Subhasis De

Assistant Professor

Department of Economics, Maheshtala College, Kolkata, India

Abstract : The Efficient Market Hypothesis (EMH) states that asset prices, particularly stock prices, "fully reflect" information. Prices only adjust when information changes. Therefore, no investor can outperform the market by achieving supernormal returns. However, when stock prices deviate from the EMH's recommendations, market anomalies are seen. Seasonal anomalies, fundamental anomalies, and technical anomalies are the three forms of market irregularities that garner the greatest attention.

This review study examines EMH and market anomalies in an effort to determine whether or not markets are rational.

Key Words: EMH, Random Walk, Martingale Hypothesis, Arbitrage, Anomalies

Introduction

The efficient market hypothesis contends that stock prices accurately reflect all available information and that markets are rational. New information is quickly incorporated into securities prices as soon as it becomes available. However, behavioural finance contends that the observed anomalies cannot be explained by this kind of efficient market. Different researchers, such as Basu (1977), Keim (1983), De Bondt & Thaler (1985), Lakonishok, Vishny, & Shleifer (1993), Agrawal & Tandon (1994), Chatterjee & Maniam (2011), etc., have shown the existence of observed anomalies in different stock exchanges around the world. Despite numerous observed market anomalies, the efficient market hypothesis continues to be the main framework for structuring and controlling the market.

This review study looks at challenges to the efficient market hypothesis and the idea that stock prices are somewhat predictable. The efficient market hypothesis (EMH), its forms, mathematical support (such as the Martingale hypothesis and random walk), arbitrage, and challenges to the EMH have all been investigated in this review paper.

Objective of the Study

In order to investigate whether markets are rational or not, this study will deal with efficient market hypotheses and market anomalies.

Hypothesis

This study examines a review of the literature to determine whether markets are rational or not.

Methodology

This literature review prioritizes logical analysis over upholding a literature chronology. The literature is constantly growing, so there has been no attempt to present an exhaustive survey.

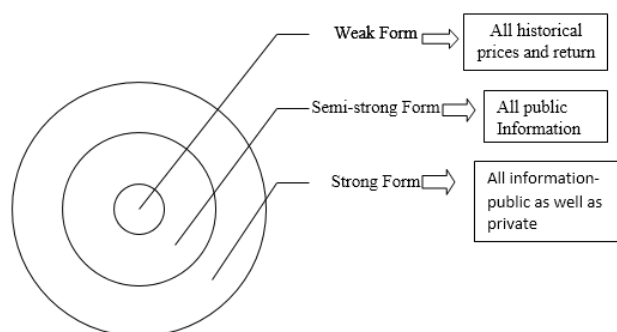
1. Efficient Market Hypothesis:

Eugene F. Fama¹, who coined the term "efficient market", defined it as the idea that asset prices, stock prices in particular, "fully reflect" information.² Prices change only when information changes. Depending on what kind of information is reflected in current prices, the Efficient Market Hypothesis has three manifestations: weak, semi-strong and strong form of market efficiency.³

The weak form of the EMH states that knowledge of past prices is of no value in predicting future stock prices. The weak form is interesting because it directly attacks "technical analysis" of stock prices. Here the analysts' study past prices and time-series data in an attempt to predict the future prices.

The second form of the EMH i.e., the semi-strong form asserts that prices appropriately summarise all information that is publicly available. If this form of efficient market is true, then fund managers, using market information, will not be able to beat market indices that summarize the stock market volatility. It is possible that the weak form is true but the semi-weak form is false.

The strong form of EMH states that prices accurately summarize all information, private as well as public. The EMH's strong form embodied both the weak and semi-strong forms. It is possible that the weak and semi-strong form of the EMH is true but the strong definition can be false.



The semi-strong hypothesis is the type of the EMH that demands the most interest out of the three. The semi-strong hypothesis is the subject of most interest since it is widely accepted that the weak version is likely to be true and that the strong form is very unlikely to be true. Prices are determined by information, and nobody can actually profit from publicly available information—this is the gist of the moderately persuasive EMH hypothesis.

1.1 Random Walk, the Martingale Hypothesis, and the EMH

There is a different, mathematical perspective on the stock market that is connected to the EMH, known as random walk. Sceptical onlookers may occasionally interpret the concept of random walk as meaning that stock price behaviour is purely random. However, it is not what random walk means. A random walk is a process in which each subsequent step has an independent fixed probability. Imagine tossing a coin that is fully "fair" in the sense that there is an equal probability that it would arrive on its head or tails. For a process to be a random walk, the probability of a heads or tails on the next toss must be independent of the history of earlier tosses.

The coin-tossing game is a classic martingale example. A martingale has the following property:⁴

$$E(X_{t+s}|X_1, X_2, \dots, X_t) = X_t \text{ for any } t, s > 0$$

X_t represents your wealth's value at time t . The wealth at some future time is X_{t+s} . E stands for the expectation operator in the equation. The simplest way to understand E is that, given your knowledge of your wealth historically, $E(X_{t+s}|X_1, X_2, \dots, X_t)$ is, on average, your expected value of wealth at a future date ($t + s$). According to martingale hypothesis, historical data doesn't reliably forecast future prices on any given day that makes the martingale, an appropriate model for the EMH.

1.2 The EMH and Arbitrage

Investing activities of the irrational investors are assumed to be uncorrelated by the Efficient Market Hypothesis, out of the logic that their trading activities will cancel each other, keeping prices unaffected. But if they are strongly correlated, or if their illogical actions do not negate each other, then some competent arbitrageurs will eliminate their action and obtain profit.⁵ Irrational investment activities were referred to as "noise".⁶ In a scientific context, the term "noise" usually always refers to "white noise" or "Brownian motion." This idea of noise intuitively refers to something that bounces around without having a specific direction. However, the bouncing is regular. Additionally, the perception that the irrational investors' influence the prices of securities and, more importantly, they generate a risk known as noise trader risk⁷ that prevents arbitrageurs from taking positions against the irrational investors in order to profit.

2. Challenges Posed by the Behaviouralists:

Then how legendary money managers, like Warren Buffett, have arguably outperformed the market over their particular lifetimes exist at all times? The behaviouralists have identified that things that are random frequently appear to not be random. The EMH has been targeted by the behaviouralists in three different dimensions: the first is logical, the second is psychological and the third is empirical.⁸

2.1 Logical Arguments

The logical argument is traditional economic theory. The behavioural finance has unveiled some of the inconsistencies of utility theory and a few ways in which rational human behaviour deviates from the predictions of the theory. Risky bets are not evaluated by people using von Neumann-Morgenstern rationality principles. In this regard the consumer choice under uncertainty where the outcomes are probabilistic has been raised by the behaviouralists. For example: How do people choose between different lotteries when they are asked to choose one? Since each person makes decisions under uncertainty in order to maximise their expected utility, economists typically approach this problem by assuming that each person's utility function over wealth, represents that person's happiness at that wealth. This is a core point on which behavioural economists attack traditional economics. Behaviouralists attempt to understand how such choices are made in real-world settings.

A perception bias occurs when someone has trouble recognizing the problem that needs to be fixed. There are numerous types of perception biases, including saliency, framing, anchoring, sunk-cost bias, etc. Two mechanisms govern *saliency*. An event is typically thought to have zero or very little chance of happening in the future if it hasn't happened previously. The anticipated likelihood of a future occurrence, however, gets overstated if the same event has occurred recently. The appropriate response ought not to be contingent on how a question is posed in the first place. The response ought to be unaffected by the question's *framing*, unless the alternative form of the question is actually different. When you try to guess about something about which you know little, you are likely to engage in anchoring, a perception bias. *Anchor* influences your guess in the anchor's direction.

2.2 Psychological Arguments

The psychological argument examines behavioural biases that appeared at contrast with orthodox economics' rationality presumptions. After the turn of the twenty-first century, neuroeconomics began to flourish in part by the interest in behavioural finance. In this regard, the experiment with capuchin monkeys⁹ displayed some of the tendencies that had uncovered in humans. Because capuchin monkeys are assumed to have preceded *Homo sapiens* in the evolutionary tree, studying capuchin monkey behaviour is crucial.

2.3 Experimental Economic Arguments

The rise of interest in behavioural finance brought new life into experimental economics which caters to a number of issues using experimental method- bubble, inefficient pricing, overconfidence, endowment, status quo effects. The impact of short selling may reduce bubbles. Evidence from experimental markets found by King, Smith, Williams, and Van Boening¹⁰ as well as Ackert, Charupat, Church, and Deaves¹¹ suggests that the likelihood of bubbles would decrease if short selling were permitted. Endowment effects and status quo biases are the focus of a quite different kind of experiment in Richard Thaler's classic treatment¹².

3. Common Anomalies:

In 1980s and 1990s many studies reported some stylized facts that were not in conformity with the EMH. In the standard finance, these facts are called anomalies. Anomalies are classified into three types: calendar or seasonal anomalies, fundamental anomalies, and technical anomalies¹⁴.

3.1 Calendar Anomalies:

The most commonly seen calendar anomalies are¹⁵:

- I. January Effect
- II. Weekend Effect
- III. Preholiday Effect
- IV. Turn-of-the-Month Effect
- V. Turn-of-the-Year Effect

January Effect

The Winner's Curse¹⁶ by Richard Thaler brought attention of the calendar effect. The January effect is the likelihood of small-company equities to outperform other asset classes and the market in the first two to three weeks of January.^{17,18}

Weekend Effect

The weekend effect is the theory that returns are abnormally low early in the trading week and abnormally high later in the trading week. According to U.S. data, Mondays typically have negative average returns, making them the worst day of the week. Fridays typically have the highest returns for American equities.¹⁹

Preholiday Effect

On trading days before holidays, market returns appear to be abnormally high.²⁰ This is consistent with Fridays having the biggest returns of the week as we approach the weekend.

Turn-of-the-Month Effect

The first three trading days of the new month and the final trading day of the prior month are likely to see a spike in stock prices.²¹

Turn-of-the-Year Effect

The rise in stock prices and stock exchange trading activity during the final week of December and the first part of January.²¹

3.2 Fundamental Anomalies

The most commonly seen fundamental anomalies are²²:

- I. Volume
- II. Value
- III. P/B ratio effect
- IV. P/E ratio effect
- V. Dividends
- VI. The Equity Premium Puzzle
- VII. Neglected Stocks

Volume

In accordance with the EMH, rational investors are supposed to engage in too few investing activities, considering the availability of only publicly available information. However, even when there is no apparent reason, we see millions of buying and selling orders on the stock market. For instance, the National Stock Exchange (NSE)'s total volume is approximately 2-3 billion in a normal trading day where around 1300+ securities are listed²³.

Value

Stocks with cheap prices compared to earnings, dividends, and historical prices are purchased in value strategies. Value stocks outperform growth stocks because of the actual growth rate or the fact that growth stock sales are substantially lower than those of value stocks²⁴. According to several researchers, the riskier nature of value stocks accounts for their greater performance. However, based on indices like beta and return volatility, value equities are not more risky than growth stocks²⁵.

P/B ratio effect

Unlike to the stocks with high P/B ratios, stocks with low P/B ratios had higher returns²⁶.

P/E ratio effect

Stocks with a low P/E ratio frequently perform better than those with a high P/E ratio²⁷. As investors lose faith in a company's future following a series of poor earnings or bad news, companies with low price to earnings are typically undervalued. A company with a high price to earnings ratio often has an overvalued worth²⁸.

Dividends

The most widely practiced dividend policies include cash-dividends, stock-dividends, stock-splits, and stock-repurchase plans²⁹. Earlier studies hold that under the no-tax world assumption, dividend policy has no bearing on the value of the company and its stocks³⁰. Unfortunately, tax worries always exist. The cash-dividend anomaly appears at this point. Furthermore, capital gains are only taxed at the time of realization. And it applies to the company's stock splits and repurchases also. Cash dividends are still preferred over other types of dividends despite having a greater tax disadvantage³¹. Additionally, the stock price of the company increases whenever a cash dividend program is announced³². It is widely contested whether market inefficiency is the cause of this anomaly³³.

The Equity Premium Puzzle

Stocks outperformed T-bills by a wide margin using actual United States data going back to 1926, and Mehra and Prescott (1985) called this phenomenon "the equity premium puzzle"³⁴. Why don't people, in such a situation, invest all of their savings in stocks rather than holding T-bills? This puzzle was explained using the concepts of *myopic loss aversion* and *mental accounting*, which are elements influencing the psychology of investors³⁵.

Neglected Stocks

Over time, the previously overlooked stocks generated higher returns. While the index outperforms the previous year's best performers³⁶.

3.3 Technical Anomalies:

The most commonly seen technical anomalies are³⁷:

- I. Moving Averages
- II. Trading Range Break
- III. Momentum Effect

Moving Averages

Technical analysis is used to find buy and sell signals for stocks. Both long-term and short-term averages are important parts of this analysis. In this strategy, you buy stocks when short-term averages rise above long-term averages and sell when short-term averages fall below long-term averages³⁸.

Trading Range Break

The resistance and support levels are the basis for this method of technical analysis. When prices reach the resistance level, which is the local maximum, a buy signal is sent out. When investors want to sell at the highest point, they put pressure on the resistance level to break through. This break out sends a signal to buy. When prices reach the support level, which is the lowest price level, this sends a signal to sell. So, technical analysis says to buy when prices go above the last high point and sell when prices go below the last low point³⁹.

Momentum Effect

According to their study conducted by Hons & Tonks (2001), investors can benefit from using momentum strategies. By purchasing prior winners and selling prior losers, investors can take advantage of the positive autocorrelation in returns for a brief period of time to make abnormal profits⁴⁰. Their research demonstrates that because winners' portfolios are riskier than losers' portfolios, returns on winners' portfolios are higher than returns on losers' portfolios. However, the study finds that these profitable ways to invest did not exist between 1955 and 1976. They only became clear in the subsample from 1977 to 1996 in the UK stock market.

Conclusion:

The EMH and behavioural finance can both be thought of in terms of using whichever serves the objective at question the best. Behavioural finance appears to be best equipped to offer an explanation if the objective is to comprehend why people sell winners rather than losers. However, the EMH appears to offer the greatest foundation for generating an explanation for why a firm with better profits growth fetches a higher price/earnings ratio. Hopefully, financial studies in the future will help us better comprehend these problems.

References:

1. Fama, E. F. (1970). Efficient Capital Markets: A review of theory and empirical work. *The Journal of Finance*, 25(2), 383. <https://doi.org/10.2307/2325486>
2. Fama, E. F. (1965). Random walks in stock market prices. *Financial Analysts Journal*, 21(5), 55–59. <https://doi.org/10.2469/faj.v21.n5.55>
3. Khan, Naimat & Khan, Sajjad. (2016). Weak Form of Efficient Market Hypothesis – Evidence from Pakistan. *Business & Economic Review*. (n.d.).
4. Burton, E. T., & Shah, S. N. (2013). *Behavioral finance understanding the social, cognitive, and economic debates*. Wiley.
5. Shleifer, A. (2013). *Inefficient markets an introduction to behavioral finance*. Oxford Univ. Press.
6. BLACK, F. I. S. C. H. E. R. (1986). Noise. *The Journal of Finance*, 41(3), 528–543. <https://doi.org/10.1111/j.1540-6261.1986.tb04513.x>
7. De Long, J. B., Shleifer, A., Summers, L. H., & Waldmann, R. J. (1990). Noise trader risk in financial markets. *Journal of Political Economy*, 98(4), 703–738. <https://doi.org/10.1086/261703>
8. Burton, E. T., & Shah, S. N. (2013). *Behavioral finance understanding the social, cognitive, and economic debates*. Wiley
9. Chen, M. K., Lakshminarayanan, V., & Santos, L. R. (2006). How basic are behavioral biases? evidence from capuchin monkey trading behavior. *Journal of Political Economy*, 114(3), 517–537. <https://doi.org/10.1086/503550>
10. Smith, Vernon & Van Boening, Mark. (1993). (n.d.). The Robustness of Bubbles and Crashes in Experimental Stock Markets., edited by . 183-200. . *Nonlinear Dynamics and Evolutionary Economics*, 183–200.
11. Ackert, L. F., Charupat, N., Church, B. K., & Deaves, R. (2001). Bubbles in experimental asset markets: Irrational exuberance no more. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.287097>
12. Thaler, Richard. (1992). Winner's curse. *SpringerReference*, chapter 6.
13. Tversky, A., & Kahneman, D. (1988). Rational choice and the framing of decisions. *Decision Making*, 167–192. <https://doi.org/10.1017/cbo9780511598951.011>
14. Latif, M., Arshad, S., Fatima, M., & Farooq, S. (2011). Market efficiency, market anomalies, causes, evidences, and some behavioral aspects of market anomalies. *Research journal of finance and accounting*, 2(9), 1-13.
15. Karz, G., historical stock market anomalies. 2010. "online" <http://www.investorhome.com/anomaly.htm> (accessed January 2012. (n.d.). Retrieved September 25, 2022, from <http://www.sciepub.com/reference/344322>
16. Thaler, R. (1992). The Winner's Curse. In *See Chapter 11, "Calendar Effects in the Stock Market."* New York: Free Press
17. Keim, D. B. (1983). Size-related anomalies and stock return seasonality. *Journal of Financial Economics*, 12(1), 13–32. [https://doi.org/10.1016/0304-405x\(83\)90025-9](https://doi.org/10.1016/0304-405x(83)90025-9)
18. Chatterjee, A., & Maniam, B. (2011). Market anomalies revisited. *Journal of Applied Business Research (JABR)*, 13(4), 47. <https://doi.org/10.19030/jabr.v13i4.5740>
19. ROGALSKI, R. I. C. H. A. R. D. J. (1984). New findings regarding day-of-the-week returns over trading and non-trading periods: A note. *The Journal of Finance*, 39(5), 1603–1614. <https://doi.org/10.1111/j.1540-6261.1984.tb04927.x>
20. Lakonishok, J., & Smidt, S. (1988). Are seasonal anomalies real? A ninety-year perspective. *Review of Financial Studies*, 1(4), 403–425. <https://doi.org/10.1093/rfs/1.4.403>
21. Agrawal, A., & Tandon, K. (1994). Anomalies or illusions? evidence from stock markets in eighteen countries. *Journal of International Money and Finance*, 13(1), 83–106. [https://doi.org/10.1016/0261-5606\(94\)90026-4](https://doi.org/10.1016/0261-5606(94)90026-4)

22. Thaler, R. H. (1999). The End of Behavioral Finance. *Financial Analysts Journal*, 55(6), 12–17. <https://doi.org/10.2469/faj.v55.n6.2310>
23. <https://www1.nseindia.com/products/content/equities/equities/equities.htm#:~:text=The%20Stock%20market%20or%20Equities,for%20trading%20on%20the%20Exchange>.
24. Graham, B., Dodd, D. L. F., & Cottle, S. (1934). *Security analysis* (Vol. 452). New York: McGraw-Hill.
25. Chan, L. K., Chen, H. L., & Lakonishok, J. (2002). On mutual fund investment styles. *The Review of Financial Studies*, 15(5), 1407-1437.
26. Lakonishok, J., Vishny, R., & Shleifer, A. (1993). Contrarian investment, extrapolation, and risk. <https://doi.org/10.3386/w4360>
27. Basu, S. (1977). Investment performance of common stocks in relation to their price-earnings ratios: A test of the efficient market hypothesis. *The Journal of Finance*, 32(3), 663–682. <https://doi.org/10.1111/j.1540-6261.1977.tb01979.x>
28. De BOND, W. E. R. N. E. R. F., & THALER, R. I. C. H. A. R. D. (1985). Does the stock market overreact? *The Journal of Finance*, 40(3), 793–805. <https://doi.org/10.1111/j.1540-6261.1985.tb05004.x>
29. Brealey, R. A., Myers, S. C., & Marcus, A. J. (2023). *Fundamentals of Corporate Finance*. McGraw-Hill.
30. Miller, M. H., & Modigliani, F. (1961). Dividend policy, growth, and the valuation of shares. *The Journal of Business*, 34(4), 411. <https://doi.org/10.1086/294442>
31. Miller, M. H. (1986). Behavioral rationality in finance: The case of dividends. *The Journal of Business*, 59(S4). <https://doi.org/10.1086/296380>
32. Long, J. B. (1978). The market valuation of cash dividends. *Journal of Financial Economics*, 6(2-3), 235–264. [https://doi.org/10.1016/0304-405x\(78\)90031-4](https://doi.org/10.1016/0304-405x(78)90031-4)
33. Thaler, R. H. (1999). The End of Behavioral Finance. *Financial Analysts Journal*, 55(6), 12–17. <https://doi.org/10.2469/faj.v55.n6.2310>
34. Mehra, R., & Prescott, E. C. (1985). The equity premium: A puzzle. *Journal of Monetary Economics*, 15(2), 145–161. [https://doi.org/10.1016/0304-3932\(85\)90061-3](https://doi.org/10.1016/0304-3932(85)90061-3)
35. Benartzi, S., & Thaler, R. H. (1995). Myopic loss aversion and the equity premium puzzle. *The Quarterly Journal of Economics*, 110(1), 73–92. <https://doi.org/10.2307/2118511>
36. De BOND, W. E. R. N. E. R. F., & THALER, R. I. C. H. A. R. D. (1985). Does the stock market overreact? *The Journal of Finance*, 40(3), 793–805. <https://doi.org/10.1111/j.1540-6261.1985.tb05004.x>
37. Latif, M., Arshad, S., Fatima, M., & Farooq, S. (2011). Market efficiency, market anomalies, causes, evidences, and some behavioral aspects of market anomalies. *Research journal of finance and accounting*, 2(9), 1-13.
38. BROCK, W. I. L. L. I. A. M., LAKONISHOK, J. O. S. E. F., & LeBARON, B. L. A. K. E. (1992). Simple technical trading rules and the stochastic properties of stock returns. *The Journal of Finance*, 47(5), 1731–1764. <https://doi.org/10.1111/j.1540-6261.1992.tb04681.x>
39. BROCK, W. I. L. L. I. A. M., LAKONISHOK, J. O. S. E. F., & LeBARON, B. L. A. K. E. (1992). Simple technical trading rules and the stochastic properties of stock returns. *The Journal of Finance*, 47(5), 1731–1764. <https://doi.org/10.1111/j.1540-6261.1992.tb04681.x>
40. Hon, M. T., & Tonks, I. (2003). Momentum in the UK stock market. *Journal of Multinational Financial Management*, 13(1), 43–70. [https://doi.org/10.1016/s1042-444x\(02\)00022-1](https://doi.org/10.1016/s1042-444x(02)00022-1)