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THE EFFICIENT MARKET HYPOTHESIS AND CORPORATE EVENT WAVES: PART I

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Part I of this article examines the arguments for and against the efficient market hypothesis.

Efficient markets are commonly defined as ones that do not allow investors to earn above-average returns without accepting above-average risk. In a traditional framework, where investors are rational and there are no frictions, the EMH states that a security’s price reflects its fundamental value, which is the sum of its discounted expected future cash flows. Put simply, under the EMH, securities are “rightly priced.” In other words, under the EMH there is no free lunch, that is, no investment strategy can earn abnormal returns. This is because financial markets arguably reflect all information available about individual stocks. The economic principle underlying the EMH is the arbitrage theory. If there is a temporary mispricing in the market, agents who constantly monitor the market will take opportunity of this mispricing by submitting arbitrage orders, which will eventually cause the share prices to adjust back to their “fair value.” Hence, any information in the market is readily acted upon, making return predictability short-lived and minimal.

There have, however, been many controversies surrounding the EMH. For the EMH to hold, there must be a number of intelligent and rational agents who act on their assessments of trends and value in order to identify any mispricing in the market. Paradoxically, if these agents were to believe in the EMH, they would not be active in the market constantly looking for arbitrage opportunities. Hence, they must believe to a certain extent that they are capable of making abnormal returns. In recent years, an increasing number of financial economists have come to question the EMH. Events such as the internet bubble of the 1990s or the stock market crash of 1987 have led many to believe that markets are not efficient. In addition, many researchers have suggested that stock prices can be, at least partially, predicted by factors such as earnings yield, book-to-market ratio, and dividend yield, to name a few. Advocates of market efficiency, however, argue that while valuation errors do occur, information is always rapidly conveyed in financial markets. It is argued that even if there were arbitrage opportunities or observable patterns in stock prices, it would be almost impossible for investors to exploit such opportunities, one apparent evidence being the inability for experts or professional investors to “beat the market” and obtain above-average or excess returns.

Through this study, I find that while the EMH has been widely accepted for decades among academics, practitioners and regulators still appear to be unconvinced. From a behavioral perspective, I show that human psychology and sentiment factors can account for some discrepancies in financial markets. I also find evidence of limited arbitrage being risky and costly and, hence, impeding the ability of investors to take advantage of profitable opportunities. Event studies are also analyzed in order to identify over- or underreaction in the stock market. Moreover, I find evidence of corporate event waves, with particular focus on investor sentiment, also contradict the EMH.

This study provides an extensive analysis of the critical discussions surrounding the EMH and deepens and strengthens the understanding of the EMH, as well as the arguments for and against. It also identifies areas that have not been explored before and hence opens up gaps for future research. From a practical perspective, this article helps to situate the current work around the EMH in the corporate finance field and hence provides a context to assist in investment decisions.

Market efficiency

The efficient market hypothesis. The EMH has long been accepted as one of the central theories of finance and considered as the foundation of many studies of market reaction surrounding different corporate events. In his influential survey article, Fama argues that security prices fully incorporate all existing information in an unbiased fashion. Fama’s argument is that when information arises, the market reacts instantaneously and share prices fully absorb all information to return to equilibrium without delay.1 The EMH assumes that all investors behave rationally and that market friction is negligible or insignificant.2

The EMH is associated with the idea of a “random walk,” which, as commonly used in finance literature, describes price series that differ subsequently to previous prices. This is based on the idea that if information is fully reflected in the stock

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prices, then tomorrow’s price change will only reflect tomorrow’s news and will be independent of price change today. However, since news is unpredictable, price changes should also be unpredictable and random.

In 1991, Fama further developed the EMH into three forms: weak, semi-strong, and strong. In the weak form, current market prices fully reflect historical data such that future share prices cannot be predicted by examining past information. Since share prices follow a random walk, price movements are not determined by historical information, but rather by new information not contained in the price series. The semi-strong form states that security prices fully reflect both current and historical information. Share prices only change with publicly available information, and any deviations from equilibrium prices are usually eliminated very quickly. Therefore, investors cannot earn excess returns by using technical analysis or fundamental analysis, especially in the long run. Downe et al., argue that the semi-strong form gives comfort to investors, in that the market price is the best estimate of a stock’s fair value once information is available. Corrado supports Fama’s idea that financial information cannot be utilized to discover under- or overpriced shares since share prices fully reveal all available information instantaneously. Jensen and Ruback report that the semi-strong form of the EMH proposes that the occurrence of specific events sends signals to the market, which then adjusts security prices. In the strong form of EMH, share prices fully reflect all information, including historical, current, and insider information that is not available to the public. Excess return can be earned even through insider trading. This, however, can be impeded by legal barriers to accessing private information.

By the start of the 1970s, tests of various asset pricing models and other empirical studies have uncovered anomalies in market behaviors. These anomalies appear to show patterns that are not based on market information, contradicting the EMH. They can be classified into three types:

1. fundamental, such as the size effect or the value effect;
2. technical, such as momentum and long-term return reversal; or
3. calendar, such as the Monday and January effect.

**Anomalies.** Several researchers have looked at the cross section behavior of stock returns to variables such as firm size, earnings yield, leverage, and book-to-market equity. Ball and Banz found that small firms have higher returns than larger firms, even after adjusting for risk. This is commonly referred to as the “small firm effect.” Findings by Basu indicate that portfolios with high earnings yield tend to have higher risk adjusted returns than portfolios with lower earnings yields. Statman and Rosenberg as well as Reid and Lanstein found that average returns on U.S. stocks are positively related to the ratio of a firm’s book value of equity to its market value (BE/ME). Bhandari documents a positive relationship between leverage and average returns. Lakonishok, Shleifer, and Vishny examine the returns of value strategies for portfolios sorted by B/M (book-to-market), C/P (cash flow-to-price), E/P (earning-to-price), and past sales growth. They identify high (low) C/P stocks with value growth stocks because their growth rate of cash flow is expected to be low (high) and they find high C/P stocks to generate higher returns than low C/P stocks. They also found higher E/P and B/M stocks to generate higher returns and higher GS (growth rate of sales) stocks to earn lower returns.

Jegadeesh and Titman found that stocks with a strong performance continue to outperform stocks with a poor past performance in the next period with an average excess return of about 1 percent per month. On the other hand, DeBondt and

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Thaler show that portfolios of past “losers” are found to outperform past “winners,” and vice versa. For instance, they find that losing stocks earn about 25 percent more than winning stocks, 36 months after portfolio formation. They argue that long-term return reversal occurs mainly because of investors overemphasizing past performance of companies. They also find intermediate-term price momentum and long-run underperformance of initial public offerings (IPOs).

The most common calendar anomaly is the January effect, whereby stock returns tend to be higher in the month of January. A widely accepted explanation for this is that investors tend to sell a large amount of securities in December in order to reduce tax liabilities. Securities are then repurchased in early January at a cheaper price. The January effect has been observed mainly in small cap stocks. Another cyclical anomaly in stock returns is the Monday effect, whereby stock prices are higher on Mondays as compared to other days of the week. These empirical results contradict the EMH.

Fama argues that anomalies presented are not significant evidence against the EMH, and that the concept of market efficiency should not be abandoned. He reports that anomalies are “chance results” that can be eliminated when methodology, sample data, or measurement of market returns change. The perceptible underreaction of stock prices to information is about as common as overreaction, and the evidence of post event continuation of pre-event abnormal returns is of similar frequency to post-event reversal. If anomalies happen randomly between over- and underreaction, they are actually consistent with the EMH. Similarly, Langdon is of the opinion that the debate around EMH is unnecessary. He suggests that the market mechanism is efficient, but sometimes prices deviate from the equilibrium because the market is a dynamic and unstable system. Dynamic systems can result in noise, oscillations, and vibration. However, the divergent share prices will return back to equilibrium very quickly. Langdon develops a model for the security price behavior and acknowledges it as “almost efficient market hypothesis” (AEMH). He finds that the greater the derivation from fundamental prices, the greater demand and supply movements would be to move share prices back to equilibrium. This is why sometimes price-reversals happen. He argues that although there are anomalies from time to time, they will gradually and eventually disappear and the market will become more efficient.

Behavioral finance

In recent years, behavioral finance or, as put in the words of Thaler, “open-minded finance,” has become a prominent branch of study of financial markets among many financial economists. It argues that investors are not fully rational and can be affected by psychological emotions and cognitive biases when they make decisions. Thus, behavioral finance attempts to incorporate human factors into financial models when analyzing market reaction to price changes. The two main concepts of behavioral finance are limited arbitrage and psychological behavior.

Limited arbitrage. The EMH hypothesis is based on two assertions. First, as soon as there is a mispricing, arbitrage opportunities are created, and rational investors will immediately snap up this opportunity in order to correct the mispricing. While behavioral finance agrees with the assumption that any existing arbitrage opportunities will be appealing to investors, it is not always the case that these are exploited. It argues that strategies designed to correct mispricing are often risky and costly, creating limits to arbitrage. As a result, share prices diverging from their fundamental value may not be able to return to equilibrium. Limited arbitrage occurs when there are constraints on opportunities due to fundamental risk, noise traders, and implementation costs. Fundamental risk states that it is difficult to find perfect substitutes for securities in the market when there is a mispriced situation. Substitutes are often highly imperfect. Therefore, it is impossible to eliminate the fundamental risk in order to move prices back to equilibrium. Noise trader risk, an idea firstly articulated by De Long et al., and studied further by Shleifer and Vishny, is the risk that mispricing worsens in the short run. That is, that the pessimistic investors causing the securities prices to be undervalued in the first place become even more pessimistic in the future, hence lowering

15 Ibid.
20 Ibid.
prices even further, creating potential losses. In addition, implementation costs such as transaction costs associated with commissions and bid-ask spreads can make arbitrage less attractive, and arbitrageurs may not be able to gain positive profits after considering the costs. Thus, in contrast to the costless and riskless arbitrage discussed in many finance textbooks, real world arbitrage entails both costs and risk, which creates barriers to arbitrage opportunities and may allow deviations from fundamental value to persist.

**Psychological behavior.** Behavioral finance also considers human psychology and sentiment factors in the market to explain discrepancies in share prices. For instance, books like *Beyond Greed and Fear: Understanding Behavioural Finance and the Psychology of Investing*, and *Inefficient Market* are famous in the behavioral finance field. Investors like to feel good about themselves, try to avoid regret, and seek pride when making decisions. They have a tendency to sell winners too soon and hold losers too long. Some investors become overly optimistic about recent gains and, conversely, overly pessimistic about recent losses. This is known as the disposition effect. *Attachment bias* makes investors emotionally attached to security. As a result, they tend to ignore bad news and end up holding the stock for too long. Investors can be overconfident, especially in knowledge and control; this is referred to as the “illusion of control” in psychology finance. Daniel, Hirshleifer, and Subrahmanyam report most of the common factors that underlay investor behavior for market under- and overreactions to occur are overconfidence and biased self-attribute. Even moods can temporarily influence a decision. For example, investors make more optimistic judgements when they are in a good mood. Although behavioral finance relaxes the EMH assumption that investors have consistent beliefs and adds human factors into asset pricing model, it is reliant on the EMH theory. Without the EMH, behavioral finance theories could not be advanced.

**Incomplete revelation hypothesis**

An alternative theory to the EMH and behavioral finance is the incomplete revelation hypothesis (IRH) developed by Bloomfield. The IRH states that statistical data about share prices are sometimes costly and not readily observable by the public and hence less revealed in market prices. Managers, for instance, will attempt to hide bad news in financial reports in order to boost stock prices and, as a result, investors will devote time and resources to identify information that is hard to extract from financial statements and not reflected in market prices. Because of this, the IRH is inconsistent with the EMH. The IRH uses insights about rational expectations to illustrate the relationship between the demand for costly information and the degree of market inefficiency. It argues that investors trade rationally and interpret the market well but are unable to obtain adequate data with agents reacting differently with different information. The high cost of information could be attributable to either regulation or managers’ attempts to display good data and hide bad news in footnotes. There is a balance between the costs of acquiring such information and the benefits this can give to the informed participant. The increased costs are only acceptable to some traders in the market.

The IRH accommodates both perspectives of EMH and behavioral finance. It stresses on the fact that the lack of apparent inefficiency does not indicate irrational decisions by investors. It is founded on the fact that investors or market participants make rational decisions based on the available information. Some accounting numbers or relationships, however, are more costly or difficult to uncover. Hence, not all participants have access to the same information and thus make different decisions. An important distinction between behavioral finance and the IRH is that behavioral finance argues that market participants react inefficiently to public information while the IRH assumes that investors are rational but that information is not always readily available to every investor. For instance, behavioral finance suggests that, while information is publicly and fully reflected in share prices, certain psychological factors or forces induce managers or investors to make decisions that are not
necessarily optimal, and these consequently affect market behavior. The IRH, on the other hand, states that investors are rational but inadequate information prevents them from exploiting opportunities or that investors suffer from cognitive bias, forming beliefs when they do not have adequate information. Brav and Heaton as well as Brandt, Zeng, and Zhang report that there are similar predictive powers arising from theories based on cognitive bias and ones based on incomplete information. The IRH actually extends EMH with recognizing the cost of data, but it renovates many phenomena of anomalies into the perspective of IRH predictions. Without EMH predicting what normal returns would be, it would be impossible to assess whether or not a market is inefficient.

**Event studies**

With the ongoing debate over the levels of market efficiency, event studies have become increasingly popular in testing and analyzing anomalies. They were introduced by Fama et al., to examine returns on stock prices in response to information about an economic event or news. Since 1980, event studies have become more popular and frequently applied in finance studies. Fama used event studies to test for the semi-strong form of EMH. If there is a reaction at all, the purpose of the test being to identify whether financial markets react positively or negatively to information discovered. If actual stock returns are to differ from predicted results, then there is evidence that event studies affect security prices and influence investor reaction. If these anomalies drift in the long run, the market can be identified as inefficient. According to Lo and Mckinley, event studies are the most successful applications in the area of corporate finance.

Event studies can be grouped according to non-self-selected events and self-selected events. Non-self-selected events are exogenous events that occur outside the control of companies, such as a regulation or law change, a financial crisis, terrorism, or a natural disaster. The event day would be the same for all firms and would generally affect all the firms at the same time. Self-selected events are where companies manage an event for a certain purpose. The event day usually varies depending on each firm. Once the event day is identified, the effects on the asset prices can be tested compared with the “normal” change in stock prices. Examples of self-selected corporate events are mergers and acquisitions, earnings announcements, new debt or equity offerings, share repurchases, stock splits, and dividend announcements.

In the existing literature, stock price under- and overreaction have been observed in these self-selected events. Ikenberry, Lakonishok, and Vermaelen examine long-run firm performance following open market share repurchase announcements between 1980 and 1990. They find that shareholders earn significant positive abnormal returns after share buyback announcements. Masulis, Vermaelen, and Dann argue that share repurchases signal favorable information about the future performance of firms. Similar to earnings announcements, Ball and Brown report evidence that stock prices respond positively to good earnings news. Bernard and Thomas support this idea and show a positive price drift for about a year after...
the earnings announcements.\textsuperscript{43} Ramnath also argues that both investors and analysts seem to underreact to earning announcements from other companies in the same industry.\textsuperscript{44} In addition, Stehle, Ehrhardt, and Przyborowsky reinforce the earlier studies of Ritter and Loughran and Ritter on the examinations of initial public offerings (IPOs) and observe positive long-run abnormal returns for three years following IPOs.\textsuperscript{45} He reports that IPOs occur more frequently in small- or medium-sized firms, whereas seasonal equity offerings typically occur in large- and medium-sized companies. Ikenberry, Rankine, and Stice as well as Desai and Jain find that firms splitting shares experience positive abnormal returns before and after the announcements.\textsuperscript{46} They suggest that stock splits are signals of positive information, which attributes the post-splits returns to market underreaction.

On the other hand, Loughran and Ritter report that companies conducting a seasoned equity offering tend to have poor long-run investments for investors.\textsuperscript{47} Investors receive average returns of only 5 percent per year following an IPO and 7 percent per year following a seasoned equity offering, which is below the average returns of non-issuing firms over a five-year horizon. Similarly, Asquith as well as Agrawal, Jaffe, and Mandelker find negative long-term abnormal returns for acquiring firms following mergers and acquisitions.\textsuperscript{48} Mitchell and Stafford attribute the negative return to market overreaction following a strong performance of acquiring firms in advance of mergers and acquisitions.\textsuperscript{49} Furthermore, Michaely, Thaler, and Womack report that there is an underreaction to the positive information in dividend initiation announcements but an overreaction to the negative information in dividend omission announcements.\textsuperscript{50} The market under- and overreactions reported in the various studies seem to challenge the EMH. However, Fama, Boehme and Sorescu, and Byun and Rozeff argue that long-run abnormal returns are subject to the long-term event study methodologies applied.\textsuperscript{51} The long-run drifts disappear when the conventional model of buy and hold abnormal returns is replaced by an unbiased model of calendar time portfolio abnormal returns.

This ends the first part of this article. The second part will appear in the May–June issue of \textit{Corporate Finance Review} and will go on to discuss corporate event waves before summing up the issues involved.


\textsuperscript{47} Op. cit. note 45 Loughran.


