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A Behavioral Assessment of Stock Market Efficiency

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ABSTRACT:

This thesis assesses the Efficient Market Hypothesis alongside behavioral finance within our digital landscape. Findings suggest that while technological advancements have improved large-cap efficiency, psychological biases and digital noise, such as viral sentiment, persistently cause short-term mispricing.

KEYWORDS: Efficient Market Hypothesis, Behavioral Finance, Market Anomalies, Investor Sentiment, Digital Information Noise, Financial Digitalization

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Figure 1. Cumulative abnormal returns for ten portfolios with different earnings news.

1 Introduction

1.1 The division of labor

This thesis has been a collaborative effort between Antti Remes and Markos Hein. To ensure a cohesive narrative, we have avoided working alone. Instead, we have a clear shared workflow based on constant communication and reviewing. Our division of work was organized by time periods, timetables and specific categorized topics. We are both simultaneously investigating our own topics and taking part in and assisting the other. Markos has focused more on the theoretical foundations of the Efficient Market Hypothesis and history. Antti has concentrated more on market behavior and on modern developments.

After completing a draft of a specific section, the other author would read, edit, and provide feedback. This ensured that the tone and quality remained consistent throughout our thesis. We manage our progress by setting short-term goals tied to each chapter. This method allowed us to work together with a continuous flow with the main hypotheses of individual contributions for this thesis. By regularly reviewing and refining each other's work, we created a cohesive analysis of how market efficiency has evolved with behavioral finance.

1.2 Background of market efficiency and modern market changes

The Efficient Market Hypothesis (EMH), pioneered by Eugene Fama in 1970, has served as a critical basis for modern financial economics. Fama states that, in an efficient market, asset prices already incorporate all publicly available information, so you cannot consistently beat the market (Fama, 1970).

However, the work of Fama was released in 1970. The world has changed quite a bit since then in a radical transformation in how information spreads by the internet and how trading is done by conglomerates and retail investors using algorithmic trading. While the EMH assumes rationality, behavioral finance offers a critical counter perspective, arguing that human psychological biases distort market pricing. Research has found persistent anomalies like the January effect or overreactions to news, that the EMH could not explain. Behavioral finance proves that we are only human, prone to irrationality.

The technological revolution in trading and information has moved from physical newspapers and trading by screaming on the phone inside a physical building to social media noise and massive quantities being traded enabled by high frequency trading by the internet. While technological advancements are expected to increase efficiency by lowering costs and accelerating the movement of information and data, they have also increased digital information noise and highlighted the importance of anomalies. Digital information noise refers to unwanted disturbances or signals that interfere with the transmission and reception of digital data, impacting digital productivity and communication. In relation to our topic, this refers to for example, low-quality, viral, meme or AI-generated sentiment that can detach a stock from its actual price in an instant.

In 2026 the market is no longer just people calling each other on a trading floor. It is a massive ecosystem of algorithms and investors influenced by certain signals and thought processes. Has the sheer speed and volume of information made the markets more efficient, or is noise distorting reality?

The paper “Stock market anomalies in the modern era” (Gordon et al. 2025), offers a tool for analyzing the noticeable contradictory increase and decrease of anomalies in the modern era. They investigate the factor zoo effect, where there has been a large increase in new identified stock market anomalies, which have in turn largely disappeared due to enhanced trading technology and lower transaction costs. This research partially supports and debunks a behavioral critique of the EMH by showing that at the same time the number of anomalies has been decreasing caused by more efficient markets, while at the same time current reigning inefficiencies like sentiment and momentum have not disappeared even after the aforementioned efficiency increase.

1.3 The research problem

The core research problem of this thesis centers around the strong contrast between the Efficient Market Hypothesis against the reality of modern financial markets, with emphasizing innate psychological biases and thinking errors in masses. The EMH has stated that prices fully and immediately reflect all available information, with the assumption that investors act rationally. This theoretical perfection is increasingly challenged by the presence of human cognitive errors and market anomalies. At what point does an anomaly become the norm?

Our study addresses that while technology has made information more accessible, it hasn't necessarily made the markets more efficient. On the contrary, we argue that behavioral anomalies, such as herding and overconfidence ensure that markets remain fundamentally driven by human psychology rather than cold informational logic only. Furthermore, the rise of digital information noise like social media, inexperienced traders, misinformation, disinformation, market hysteria and viral trends often amplifies these anomalies, leading to frequent price distortions and new market inefficiencies that the EMH cannot necessarily explain consistently enough.

The problem we explore is whether the concept of an efficient market is a realistic constant reality or just an example of a world in theoretical perfection. By analyzing the period of the 1970s till 2020s, we aim to demonstrate that as long as human emotion influences trading, the market can't realistically continuously reach the state of perfect efficiency described in classic financial theory.

1.4 Research hypothesis development based on literature

Fama states that asset prices have been baked in all available information, making it nearly impossible for investors to consistently achieve abnormal returns over any time periods. However, certain developments and innovations have resulted in some questions being posed to this theory. The way in which information channels have changed has been quite dramatic, resulting in information reaching market participants quicker while behavioral finance has shown some deviations from the decision making that is expected from the markets according to Fama. This poses a question about how true the theory of efficient markets is in this day.

During the last few decades trading activity and market quality have changed. Faster trading systems, better access to information and increased participation in financial markets may have helped information to become incorporated into prices more quickly. Chordia et al. (2011) show that market quality has improved in important ways as trading activity has developed. McLean and Pontiff (2016) also show that return predictability often weakens after academic findings become known suggesting that markets may become more efficient once information is discovered and used by investors. Therefore, our first hypothesis is:

H1: Market efficiency has improved over time due to faster information spread.

While information available to investors has improved, Kahneman and Tversky (1979) showed in their prospect theory that investors don’t always act rationally.
There is plenty of clear evidence of anomalies in the world markets like from the studies from Banerjee (1992) and Barber et al. (2021) of herding and attention biases respectively. Therefore, our second hypothesis is:

H2: Behavioral anomalies including but not limited to herding and biases of attention, optimism, and extrapolation continue to generate short-term inefficiencies.

Beyond speed is also the quality of information that matters too. Social media platforms have become major sources of information, yet much of this content can be quite low quality resulting in it being more noise of high speed rather than genuine useful information. Events, like the GameStop in 2021, showed that noise trading can drive prices far from their fundamental values as demonstrated by (Welch, 2022). Therefore, we propose that:

H3: Digital information noise increases short-term market inefficiency.

1.5 Structure of the thesis

This thesis has been divided into three main chapters each serving purpose in addressing the hypothesis and research questions raised in this paper. It introduces the research problem and history surrounding financial market efficiency in the modern era that is affected by rapid technological change and behavioral biases. In addition to that, it develops the different research hypotheses that are based on the existing academic literature. The second chapter establishes the theoretical basis upon which the analysis is presented. It begins with a comprehensive presentation of the efficient market hypothesis, touching on the effect that mass information has on the markets. It then goes over the core analysis of this thesis, going over academic papers. The chapter then concludes with a summary evaluating the evidence for and against the different research hypothesis. The third chapter then brings the paper to a close by summarizing the key findings in relation to the research questions and hypotheses. It discusses the extent to which each hypothesis is supported based on the reviewed evidence and discusses possible future research.

2 Theoretical Framework

2.1 EMH Why is Fama’s work important?

Fama’s 1970 paper is vital for an explanation of modern efficient markets since it serves as the benchmark for any future critical analysis of market efficiency, or inefficiencies. To study if markets are inefficient, we will first define the state of perfect efficiency that is being challenged. The first paper from Fama provides a chronological starting point illustrating the ideal. The three forms of efficiency offer a way to categorize modern anomalies.

According to Fama (1970), the primary role of a capital market is built upon the concept of allocating ownership of the economy’s capital stock. In a theoretical ideal market, security prices serve as accurate indicators that help firms and investors make informed decisions regarding resource allocation. This leads to the main theory: the assumption that in an efficient market, prices will fully reflect all available information.

To describe the conditions for this efficiency, Fama identifies three sufficient conditions. Firstly, a market with no transaction costs in trading securities. Secondly, an environment where all available information is available to all market participants for free. And lastly all should agree on the implications of current information for the current price and future price distributions (Fama, 1970). Fama clarifies that these idealized conditions are sufficient but not necessary for efficiency to exist.

Fama (1970) introduces three forms of efficiency. These three forms provide the benchmark to categorize information sets. By defining weak, semi-strong and strong efficiency, we can analyze how digital noise and human biases disrupt specific levels of price adjustment, specifically regarding the transition from historical data to almost instant modern information flows and sentiment.

The weak form of efficiency asserts that security prices like stocks at any current moment include fully all information found in historical trading data. Because all past price movements are technically incorporated into the current value, technical analysis and charting gives no value. Fama's analysis concludes that price changes follow a random walk, making past trends useless for predicting future returns.

Semi-strong forms of efficiency extends the same logic to all publicly available information at a current moment, suggesting that prices adjust instantaneously to new data. Fama identifies this level as a test of whether prices move to new levels efficiently in relation to new publicly available information. Fama concludes that market evidence supports the semi-strong form of efficient markets.

The strong form represents the most extreme version of the hypothesis, as prices reflect all information, including what is private or restricted to insiders. In practice this is essentially an unfortunate reality in minority groups rather than the norm. Some groups simply have a continuous advantage like specialists or corporate insiders that possess advantages for potential trading information.

A major ambiguity in the work of Fama is the joint hypothesis problem, which reminds us that testing market efficiency is potentially impossible. Fama realizes that the efficient market prices fully reflect all available information is too general to actually empirically test. For valid tests a researcher must combine EMH with a model of price formation. But any results would test both the market's efficiency and the validity of the price formation model. An anomaly cannot be separated from the two models. So it is not possible to identify if the markets are inefficient or if the pricing model is flawed (Fama, 1970).

In his newer work 21 years later, "Efficient Capital Markets: II", Fama gives an updated review of the questions in his previous work, where he also confirms the existence of the joint-hypothesis problem, but does not resolve it (Fama, 1991). Also, Fama says that the existence of anomalies does not provide an insightful enough explanation to disprove the EMH due to the joint-hypothesis problem, where anomalies are explained as missing risk factors. Nevertheless, the theory cannot be ignored since the markets are efficient enough, as mentioned before, due to beating the market consistently is statistically improbable.

2.2 Mass information and media in market efficiency

In studying the effects of information on the financial markets, it is critical to recognize that media does not share data and info neutrally. It actively changes the status quo through sentiment. Paul C. Tetlock's paper on the role of media in stock markets (2007) investigates how media covering financial markets interacts with the stock market, proving that media content leads to market behavior through sentiment rather than purely factual evidence.

This paper gives an understanding on how information flows could dictate markets inefficiently with psychology and not with facts alone. Careless information can trigger reactionary behavior, rather than make traders act on actual market shifts. One of his main findings is that high media pessimism can predict downward pressure on market prices, that are usually corrected. The other main finding is that unusually high or low pessimism can predict high market trading volume. So potential media attention rhetoric can distort pricing noticeably. Proving that modern information can more easily amplify short-term noise over actual truth. Though these usually get corrected over the long-term.

2.3 Evidence supporting EMH

The efficient market hypothesis was an idea that was already gaining attention even before it was formulated by Fama in his famous paper in 1970. Numerous studies before and after were found to support it in some shape or form. This is also the foundation upon which we base our hypothesis around the fact that market efficiency has improved over time. These studies found that markets tended to be efficient at incorporating information into prices. This part of the study will go over these studies. Later decades would bring some questions around the hypothesis but that is something that will be touched upon later.

Some of the points that were brought up by Fama in his 1970s paper were already made before that. One of these is the random walk hypothesis. In the random walk hypothesis, it was proposed that stock prices would be completely random and such there would be no predictable price action to be exploited. This idea can be traced back to Friedman (1953) who proposed that this sort of irrational predictable price action would be countered by those seeking arbitrage and as such be eliminated from the markets. This does seem quite straightforward. If some predictable pattern existed that could be exploited, then market participants could exploit it until it would not appear again, and such could not be exploited again. There is some criticism that could be levied against this due to the regulations that affect markets. Jones and Lamont (2002) found that it was quite expensive to short some stocks and such this could lead to an overreaction that could not be exploited properly, and therefore would challenge the notion Friedman proposed (1953) that overreactions and underreactions could be exploited the same way.

Fama's work of course has been criticized. Lo and MacKinlay (1988) found using variance ratio tests that smaller cap stocks had much greater predictability than Fama had found. They also discovered that Fama had focused too much on large-cap stocks with bigger liquidity, and as such the results were skewed.

Markets seem to have also become more efficient in the last few decades. Chordia et al. (2011) found in their study that examined short-term return predictability. They found that especially after the year 2000, the correlations that had been found earlier seemed to have disappeared. They attribute this increase in efficiency to algorithmic trading, lower costs and increase in the speed of information incorporating into prices. This would support our hypothesis around the idea that markets have become more efficient over time. This also makes sense. Before the internet, for example, fast and reliable information could have been quite difficult to get. You would have possibly read it in the newspaper or watched it on the news. Now you can simply assess it after a few clicks. It does also make sense that markets would increase in effectiveness as a result of algorithmic trading. The ability to effectively exploit existing arbitrage opportunities would cause those opportunities to diminish or potentially disappear entirely.

It has also been found that the spread of internet has also increased the effectiveness of the markets in other than purely informational way. Bogan (2008) examined the relationship between stock market participation and the internet. He found, as you would expect, that increases in internet access resulted in increased participation in the stock market. This had the effect of making the market more efficient as there were now more participants to share information about stocks and exploit arbitrage possibilities. This then contributes to more effective price discovery. The conclusions in this paper do seem reasonable. When it comes to our hypothesis, this paper does seem to support it.

2.4 Behavioral finance challenges to EMH

Efficient market hypothesis has been challenged several times after it was first introduced. Behavioral finance has been used to examine how different psychological factors and biases play a part in the workings of the market. It has also been used to identify anomalies that seemingly contradict the notion of efficient markets. Anomalies such as herd behavior, January effect, and post-earnings drift are but a few regularities that have been found. These anomalies seem to suggest that investors don't always act as efficient market hypothesis would suggest. Investors seem to let their emotions and biases guide their investment decisions, therefore creating arbitrage opportunities to be exploited in the market. It's on all of these that we base our hypothesis around how behavioral anomalies including but not limited to: herding and biases of attention, optimism and extrapolation continue to generate short-term inefficiencies.

De Bondt and Thaler (1985) found that stocks, that had performed poorly in the last three to five years, went to perform much better than prior winners. This proved that markets could overreact to bad news from poorly performing assets, driving their price down irrationally, while doing the opposite for winners. Jegadeesh and Titman (1993) also found similar effects with stocks that had performed well seemingly went to perform even better in the near future driven by momentum even though fundamentals would have not supported this growth. Something that also seems to challenge the notion of efficient markets is something called January effect where Rozeff and Kinney (1976) seemingly found that stocks seem to perform better in January for no apparent reason. Stocks seemingly also have a delayed reaction to earnings as found by Ball and Brown (1968). Stocks would move in positive or negative directions based on the earnings report seemingly far after the earnings even though this information should have been incorporated into the prices quickly.

Individuals also seem to make decisions, as found by Kahneman and Tversky (1979), on perceived gains rather than on final gains. They also found that investors are risk-averse even though according to the efficient market hypothesis this shouldn't happen. Behavioral finance has also shown that stocks have much higher volatility than one would expect from pure fundamentals. Shiller (1981) showed that stocks move much more than expected from dividend changes seemingly contradicting the notion of a rational investor and proving that how investors feel also move the markets. Something that also seems to cast doubt on the EMH is a finding that Barber and Odean (2000) made. They found that overconfident investors will overtrade which will result in them getting smaller returns, something that again seems to contradict the notion of rational market participants.

Something that behavioral finance also identified is herd behavior. Banerjee (1992) found that investors were willing to model their behavior after what other investors had done, and thus mimicking a herd, rather than acting on their own private information thus not acting rationally and resulting outcome that efficient market hypothesis would not predict.

Something as simple as investor mood also plays a quite large role in determining how a stock will perform as Baker and Wurgler (2006) found out. Stocks, and especially speculative stocks, were sensitive to changes in the market mood. They found out that during a euphoric market mood, stocks grew in valuation much faster than their fundamentals would justify, however, once the mood in the market changed, these stocks would come crashing down hard. According to efficient market hypothesis this should not happen as this irrational growth that outpaced by fundamentals would not happen as rational participants of the markets would see that and exploit it.

It is quite clear from all this that there are some short-term inefficiencies in the market. Investors are clearly sometimes driven by something other than fundamentals, at least in the short-term. Evidence also seems to support our hypothesis about behavioral anomalies causing short-term inefficiencies in the markets.

2.5 Digital era market efficiency, social media and information noise

Digitalization that has happened in the last few decades has changed markets quite drastically. Information has become much faster. It has also become much easier to access. Fama (1970) in his theory about markets states that information should be incorporated quickly into prices, leaving no room for arbitrage. The digital era has complicated this due to the fact that there is an overwhelming amount of information available now due to social media. This is the idea which we draw our hypothesis about how digital information noise increases short-term market inefficiency.

It has been shown that investor behavior can influence prices. Baker and Wurgler (2006) found that sentiment had stronger effect on those stocks whose valuation was harder to determine. These were the stocks of those companies that were smaller or younger. This could be applied to our hypothesis in the idea that digital information has bigger effect on these volatile stocks. We could also apply the finding that Tetlock (2007) made. He found that media tone can predict how markets behave in short term and drive stock prices away from their fundamentals. We could therefore think that if there is a big negative sentiment around the stock on social media this could then have effect on prices. Both authors do note that these effects are quite short-term, something that is in line with our hypothesis.

There has been some recent evidence about the links between short-term price action and digital information. Barber et al. (2021) examined how Robinhood investors seem to focus on buying stocks that had the most noise around due to them having high returns recently or being strongly visible on the platform. These stocks would then go and underperform showing that at least some part of the price movement was driven by sentiment rather than fundamentals. This does support our hypothesis that digital information can create short-term market inefficiencies.

There is also some evidence showing retail in more favorable light. Welch (2022) studied what stocks Robinhood users held and found that stocks that they held generally went to perform well. This was case especially during periods such as the Covid crash and recovery of 2020. He did find something similar to what Barber et al. documented, showing that Robinhood users seem to invest in stocks that have a large amount of noise around them. There could be an interpretation to be made that perhaps a part of why these stocks went to perform was because of sentiment rather than fundamentals. Clearly again supporting our hypothesis.

Perhaps one of the strongest pieces of evidence that digital information can create short-term market inefficiencies are the so-called meme stocks. There are stocks where, in short term, the price is driven to such extremes that they completely disconnect from fundamentals. The most famous of these stocks is the aforementioned GameStop. Pederson (2022) describes how in GameStop's case combination of short squeeze and large amounts of noise around the stocks resulted in its explosive short-term growth. He also describes how social media was used to almost coordinate a rise in price. Events like these are perhaps the strongest evidence when it comes to our hypothesis. It does also show that not all information has to be necessarily true to be incorporated into the prices.

Clarke et al. (2021) looked at how fake news affected the markets. They found that markets do generally tend to react to false information. They found that fake news grabbed investors' attention leading to the prices diverging from their fundamental values. They also found that effect on prices would be more pronounced in short-term rather than long term. This again supports our hypothesis quite strongly. It also shows that short-term market inefficiencies that occur can be due to an excess of information rather than the lack of it. This contradicts the aforementioned efficiency increase from said information growth increases, rather than a decrease. We will explain this difference later in our thesis.

2.5.1 Robinhood trading platform and online information

According to Barber et al (2021), modern digital platforms have drastically changed how investors behave. Major investing platforms like Robinhood have made investing easier than ever before. It makes placing trades much easier and reduces friction to increase trading volume. Meanwhile, regulators have argued that this platform uses potentially unethical strategies like marketing towards inexperienced investors and gamification of investing to encourage continuous use of the app. This is proven by statistics showing that Robinhood's users trade 9-40 times more shares than users of more traditional investing platforms like E-Trade and Charles Schwab.

These statistics could be explained by information sharing on online forums like Reddit's WallStreetBets, that significantly increases information noise, and which leads to having Robinhood investors trading whatever is the most relevant in their information bubbles than other investors. Because these users are highly influenced by attention, these investors are more likely to herd than other investors. This trading noise inflates asset prices temporarily, which leads to negative outcomes. Barber et al. document that average abnormal returns in 20-day periods are about -4.7% for the top stocks purchased each day. Ultimately, modern digital information spread in overtly available information that has positive and negative news, and which may or may not be mis- or disinformation caused by 100% unverifiability of online sources enables negative effecting hoard behavior anomalies in markets that challenge the EMH.

2.6 Criticizing the three forms of efficiency

Weak form efficiency asserts that current stock prices fully reflect all historical price data. So in theory, technical analysis of past patterns should be unable to generate consistent excess returns. However, academic literature and past trends have provided significant evidence that markets often fail to meet this standard of theory due to a significant number of deviations from this standard.

If markets truly were weak-form efficient, price changes would be independent of past performance. Narasimhan and Sheridan (1993) identify the momentum effect that goes directly against the random walk of stock prices where prices move unpredictably. Stocks that have performed well in different time horizons in the past usually keep outperforming 3- to 12-months into the future.

This clear positive correlation could suggest that information does not instantly reflect in the price, but slowly spread to different investors, where investors tend to underreact to short-term news and overreact to long-term news, allowing historical trends to predict future returns that can be exploited (De Bondt and Thaler, 1985). In an efficient market, prices would adjust immediately, or fast enough where exploitation is minimal and hard. Though profits tend to slow or even reverse after the maximum 12-month period. Here, extreme losers over several years eventually tend to outperform previous winners. These continuous cycles in markets directly contradict with the weak form efficiency. Alternatively, to Narasimhan's and Sheridan's work, De Bondt and Thaler see portfolios with prior losers outperform prior winners in a longer timeframe of 36 months to five years, where corrections occur.

Semi-strong form of efficiency asserts that stock prices instantaneously incorporate all publicly available information in addition to past prices, which makes technical analysis ineffectual. However, empirical and theoretical evidence finds that there are significant gaps in theory in this form of efficiency also. When a company announces earnings which are better than expected, the semi-strong form efficiency predicts that the price of said stock would adjust almost immediately, leaving no extra profit for investors who trade on that news. This form of efficiency works most of the time but it's not perfect since prices overreact or underreact or there are delays, a.k.a. anomalies.

The most striking challenge to semi-strong form is the Post-Earnings-Announcement Drift, brought forth by Bernard and Thomas (1990). If markets were semi-strong efficient, prices would adjust to earnings surprises immediately. Instead, historical data shows that stocks continue to drift in the direction of an earnings surprise for several months. This persistent drift suggests again that investors initially underreact to public financial statements, creating a predictable trend that contradicts the initial basis of this form of efficiency.

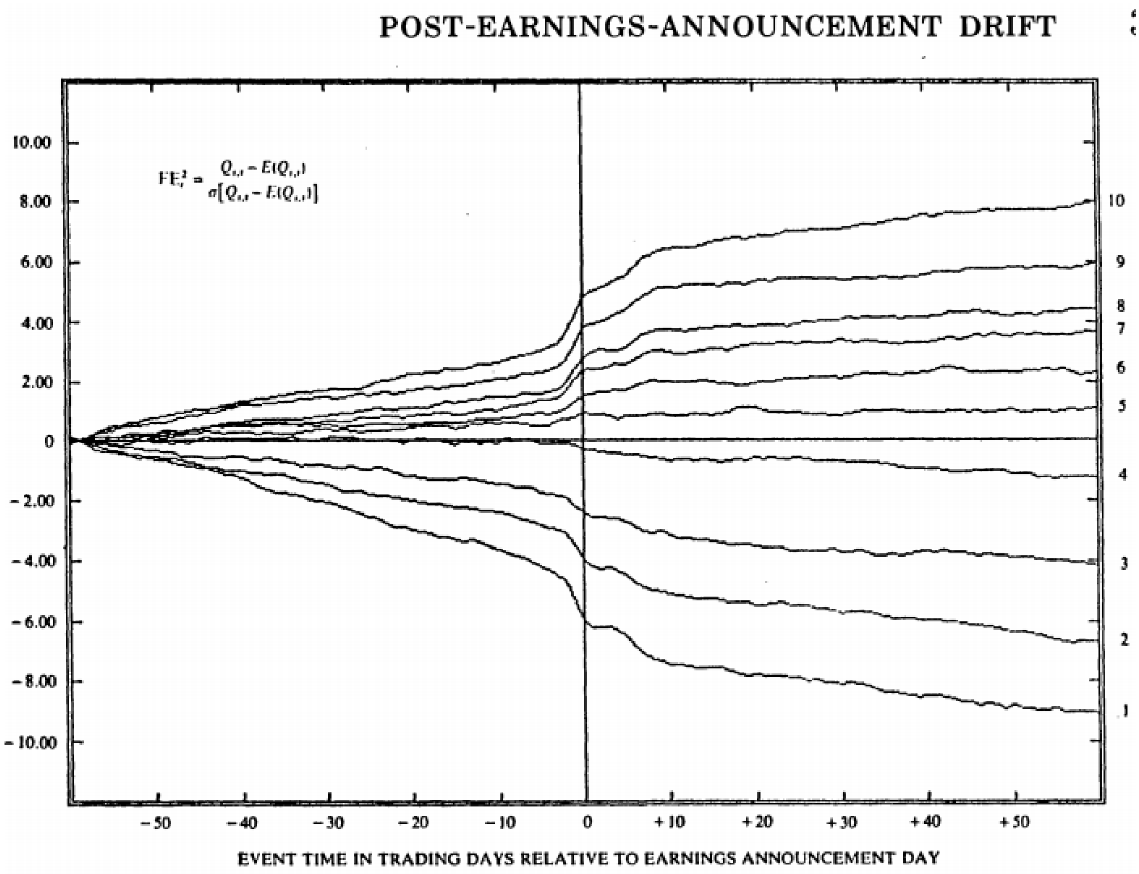

Figure 1. Cumulative abnormal returns for ten portfolios with different earnings news.

McLean and Pontiff (2016) analyzed 97 different strategies for picking stocks, finding that these strategies worked well in the past, but lost much of their power once they became well-known and spread in academic papers. Specifically, McLean and Pontiff realized that portfolio returns decreased from 26% to 58% post publication. This proves that the market did not automatically price this information until it was highlighted and discussed by researchers. So, investors find out about specific types of mispricing from academic publications in a transmission of information.

Once a study is released, professional traders use that information to fix the stock price. This proves also that the market was not efficient before the paper came out, because information was already public but was not yet reflected in prices. However, friction in trading prevent arbitrage to completely eliminate mispricing. The market is not perfect, it only becomes efficient after people study it long and hard, and even then, high costs can keep it from being efficient.

The strong form of efficiency asserts that even private or insider information is reflected in prices. This is widely considered obviously the most unrealistic form of efficiency. The existence of profitable insider trading, and the strict legal systems designed to prevent it, proves that non-public information provides a significant advantage. If the markets were truly strong form efficient, an insider would never be able to earn excess returns on their knowledge.

Kacperczyk and Pagnotta (2019) examine how prices react when insiders trade on non-public information. When traders have private information, trading volume and volatility increases, and illiquidity and bid-ask spreads lower. Prices move in the correct direction. They find that while informed trading does increase price informativeness, the market does not reach a state of full efficiency until the information is officially made public. With an average of a seven-day lag between private information and its fusion into the price shows us that strong form efficiency is also just a theoretical ideal rather than a realistic reality, since prices adjust because of their trades, not before.

2.7 Literature review summary and hypothesis evaluation

Overall, it seems that literature supports our hypothesis. When it comes to H1, the evidence is quite strong. The literature seems to show that many abnormalities in the prices have disappeared. It also showed that increases in internet participation have led to a more efficient market. There was some evidence that there was inefficiency in the market when it came to stocks that had smaller market capitalization. The literature seems to support H1 mainly for large and liquid stocks while efficiency may remain weaker in stocks that are smaller or harder to value.

When it comes to H2 support is also strong. Behavioral finance research indicates repeatedly evidence that investors do not always behave fully rationally. Research has found a momentum effect in the market, where past winners tend to continue outperforming in the near term. Post-earnings-announcement drift demonstrates that stock prices may underreact to publicly released earnings information. Behavioral finance studies have proposed the prospect theory, explaining why investors may be loss averse and make decisions based on perception rather than rationality. It has been shown that stock prices fluctuate more than fundamentals such as dividends would justify implying that sentiment influences prices. There is clear proof of overconfident investors trading excessively and earning lower returns. Together these studies seem to strongly support H2. Still the evidence also seems to support the fact that these anomalies exist in the short-term rather than in the long-term since many anomalies weaken after a wider investor base becomes aware of them.

When it comes to the H3, evidence again is strong. Digitalization has made information faster and more accessible, which should improve market efficiency. However, literature shows that digital information can also create noise and create short-term market inefficiencies. It has been shown that media tone can lead to short-term market movements and that investor sentiment especially affects speculative stocks and stocks which value is hard to determine. Literature also provides evidence about Robinhood investors showing that stock that had the most noise around perform worse in the near medium term. This suggests that digital information noise can temporarily diverge prices away from fundamentals. There has been some push back on this, showing that Robinhood investors did not always perform poorly, especially during the 2020 recovery but at the same time it does show that retail investors were attracted to highly visible stocks. The GameStop event particularly provides a clear example of how social media coordination, short squeezes and online narratives can produce short-term mispricing. Literature also show that fake news can affect prices, especially in the short-term. The hypothesis is supported in mainly short-term. The long-term impact is less certain because prices seem to often correct after the initial wave of attention or misinformation disappears.

3 Conclusion

This thesis was obviously motivated by the efficient market hypothesis theoretical perfections and imperfections, and the messy reality of modern stock markets. The modern era is clearly defined by algorithms, social media mass-information and retail gamification. These act as sort of a concrete counterbalance to the EMH. We went out to determine whether technology and information have finally perfected efficient markets or helped to widen the gap between efficiency and inefficiency.

The findings have indicated a bipolar reality. For large-cap stocks markets are more efficient than ever where information is absorbed almost instantly. However studies consistently identify patterns like momentum and post earnings announcement drift, which are driven by humane errors like overconfidence and herding. Furthermore, the digital noise from meme stocks and get-rich-quick-schemes ect. demonstrate that social media can detach prices from their actual values. Ultimately all three hypotheses were supported. Efficiency has increased in speed, but behavioral noise continues to create significant short-term opportunities and risks.

The primary limitation of this study is its reliance on secondary literature. We did not conduct original testing or utilize any collected data. We only used existing academic findings. Our conclusions are subject to the methodologies and ironically the potential biases of the original researchers. So our analysis is theoretical, rather than being calculated.

For future research we see an interesting avenue that no other has gone in depth with. The proclaimed efficiency of the markets is fairly subjective since it has no coherent universal description. After investigating the discrepancies between so-called efficient pricing and cognitive errors in traders, one potential estimation for efficient markets would be a +/-5% efficiency margin, where the pricing could potentially be officially called efficient at.

We propose that the market efficiency could be cyclical: markets are somewhat efficient with high adaptation, made inefficient by cognitive biases and anomalies, after which then made somewhat efficient again with corrections and arbitrage, where the cycle stops and begins again. Cyclical market efficiency is different from relatively smaller trading noise with trading quantities and price change amounts.

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