Behavioral Finance for the Individual Investor

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Abstract

The Efficient Market Hypothesis (EMH) has been generally accepted in academia despite its well-researched flaws; by understanding how and when markets deviate from efficiency, investors have an opportunity to not only better understand their investing habits, but also possibly generate higher investment returns. Various market anomalies, such as the Value Effect (De Bondt & Thaler, 1985), the Monday Effect (French, 1980), and the January Effect (De Bondt and Thaler, 1958 & 1987), attest to the fact that markets experience periods of deviation from efficiency. Fiévet and Sornette (2016) finding that markets experience inefficiency during periods of significant volatility is confirmed by behavioral finance, which explains how behavioral heuristics influence investment decisions, specifically greed and fear (p.38). Andrew Lo based his substitute for the EMH, the Adaptive Market Hypothesis (AMH), on the supposition that markets become inefficient because of irrational investor behavior (Urquhart & McGroarty, 2016). In applying these concepts to an individual's portfolio, it could provide great insight into their own trading patterns; for investors with higher risk tolerance, these theories could help produce larger returns for their investment portfolios.

Behavioral Finance for the Individual Investor

Investors have been investigating and implementing various strategies and techniques that could lead to returns that outperform the broader market; many investors, however, fail to achieve this goal. Several researchers, such as *Dalbar* (2019), *Morningstar* (2019), and Hsu, Myers, and Whitby (2016), have found that individual investors typically produce returns that are abysmal relative to those of common benchmarks and even those of mutual funds. This historical underperformance is the reason why many professionals and academics in the finance community have accepted the EMH that was proposed by Eugene Fama (1965, 1986, 1988). The premise of the EMH is that markets are fully efficient and that individual investors cannot generate returns that are higher than those of the broader market, also known as alpha or excess return. Though many researchers have found flaws in the EMH, such as Lo and MacKinlay (1988), Lo (2017), De Bondt and Thaler (1985, 1987), and Tetlock (2017), the finance community has not come to agreement on an acceptable replacement. One plausible alternative for the EMH has surfaced and, while still an exceptionally new theory, it is gaining traction within the finance community.

Andrew Lo (2017) proposed the AMH in an effort to reconcile market efficiency with behavioral finance. According to Lo (2017), the stock market is impacted by human decisions and human decisions are influenced by emotions; the AMH defines the effect that human behavior has on the stock market and how this behavior influences market efficiency. Lo (2017) notes various behavioral heuristics that humans exhibit, specifically how humans are inherently risk averse and exhibit irrational behavior when influenced by greed. Kahneman and Tversky (1979) asserted that humans dislike losses more than then they like gains, and referred to this tendency as risk aversion. This fear causes investors to sell during periods of decreasing prices

and buy during periods of increasing prices; the opposite of the adage of buying low and selling high (Kahneman, 2018). Greed, derived from previous financial success, prompts investors to take unreasonable risks and reduce due diligence of investment opportunities (Kets de Vries, 2016). Lo (2017) asserted that once widespread fear overtakes investors, there is often extensive selling following; times like these are when markets become inefficient and prices do not accurately reflect securities inherent intrinsic value, the converse is also true is a "greedy" environment (p. 319).

Introduction to the Efficient Market Hypothesis

One of the most prominent theories in finance, the EMH has been widely recognized by finance academics and practitioners as being the prevailing explanation of stock market efficiency. Fama (1970) introduced the EMH, making the claim that stock market prices fully represent all available information. He described three various forms of stock market efficiency: a weak from, a semi-strong form, and a strong form. Fama (1970) asserted that under the weak form all past prices of a stock are reflected in the current stock price, under the semi-strong form all publicly available information is immediately reflected in the price of the stock, and under the strong form all information, both public and private, is included in the current price of a stock. Most of the current discussion on the EMH is on the weak and semi-strong forms, as they are the most commonly accepted forms of the EMH (Lo, 2017). Fama (1970) claimed that, under the strong form, all public and private information is automatically considered in the price of a stock; however, if this were true, insider trading would not be illegal because it would create no advantage. Nonpublic information can, however, assist in generating positive alpha (Hudson & Urquhart, 2013). Consequently, most research focuses on the semi-strong and weak forms of the EMH.

The EMH, at its core, asserts that no information, insight, or advantage can help investors achieve superior returns. As Andrew Lo (2017) stated, “Through the power of efficient markets, we gather all information relevant for our future, we anticipate all potential changes in our environment, our expectations are rational, and prices full reflect all available information” (pp. 43-44). Lo (2017) also said that, should any advantage present itself, investors will use that until the effects of that advantage no longer help in producing excess returns; this tactic is referred to as arbitrage and is how markets remain efficient. Hudson and Urquhart (2013) deduced that, under the weak form, prices already reflect all information that can be derived from analyzing market data such as past prices, trading volume metrics, and other related information and arbitrage would eliminate these profits in an efficient market (Hudson & Urquhart, 2013). The semi-strong form is similar to the weak form; however, it takes into account public information as well (Hudson & Urquhart, 2013). A market is said to be efficient if the prices of securities reflect all publicly available information; thus, if it is possible to use any information to gain an advantage to generate alpha, a market is said to be inefficient. Studies, such as those by Liu (2020), Malkiel (2003), and Busse et al. (2010), conclude that markets are, in fact, efficient.

Application of the EMH

Considering the impact that the EMH could have on markets if it is proven to be true, that it is impossible for investors to outperform markets without taking on additional risk and that they would be better off buying passive investments, researchers have spent a considerable amount of time attempting to determine its veracity. As Malkiel (2003) explained, the EMH infers that “markets do not allow investors to realise [*sic*] above-average returns without taking above-average risk” (p. 60). This ability to generate above average returns, without taking on additional risk, is referred to as alpha or excess returns; producing higher returns through

increased risk is referred to as beta, which is a measure of volatility. Greenwald et al. (2001) claimed that active managers cannot use alpha or beta to outperform the market and discovered that approximately 70% of active professional money managers underperform the market, while 30% outperformed the market. A significant amount of the current research on stock market efficiency points to the same conclusion: that the EMH is valid.

Many of the current studies on the returns of mutual funds, pensions, and individuals have found that markets are efficient and rational. Because of this acceptance of the EMH, many investors and researchers have concluded that equity mangers seem to subtract rather than add value relative to the performance of the S&P Index (Liu, 2020). Liu (2020) claimed that over 70% of domestic equity mutual funds, not including the poor returns of liquidated funds, underperformed the S&P composite 1500 index during 2019, while actively managed large-cap mutual funds underperformed the S&P 500 89.3% of the time over the last ten years. Actively managed small cap and mid cap mutual funds also fared poorly, as they have underperformed their respective benchmarks 88.6% and 84.2% of the time, respectively, over the last ten years (Liu, 2020). Much research has been devoted to the study of mutual funds and it has shown a common thread of underperformance. Similar to mutual funds, pension funds provide a gleaming example of how market efficiency works.

Historic Pension Fund Returns

In their study of 769 all-equity U.S. pension funds, Lakonishok, et al. (1992) found that the equity portion of these pension funds underperformed the S&P 500 by an average of 1.3% per year from 1983-1989. Though Lakonishok, et al. (1992) said that pension funds inability to outperform the S&P 500 was likely due to their slant against small-cap stocks, they nevertheless concluded that, “As far as performance is concerned… equity mangers seem to subtract rather

than add value relative to the performance of the S&P Index" (p. 378). Additionally, Lakonishok et al. (1992) found that, from 1971 to 1980, 74% of the pension funds in the Becker database, the predecessor of the SEI database, underperformed the S&P 500. An interesting discovery in that study is that the managers of these funds were found to demonstrate a lack of return consistency; poor performing managers increased returns significantly in the subsequent year and funds with strong returns had lower returns in the following year. Though there could be many origins as to what caused this anomaly, the research nevertheless found that there is a correlation between returns of two time periods.

A similar study conducted by Ippolito and Turner (1987) analyzed the returns of 1,526 U.S. pension funds and found that, from 1977-1983, these pension plans underperformed the S&P 500 by an average of 0.44% a year, net of expenses and fees. The researchers concluded that a substantial factor in the underperformance of these funds was due to the stock trading in the portfolios of active funds (Ippolito, et. al., 1987). Additionally, Busse et al. (2010) performed a study on 1,448 institutional investment management firms from 1991 to 2008 and found little proof that these management firms were able to contribute to favorable growth. While the estimated alpha of the funds in this study was positive, meaning that there were favorable abnormal returns, the researchers suggested that there was little to no alpha due to several variations in the estimation techniques (Busse, et. al., 2010).

While the previously listed studies have shown that the EMH is accurate, because most funds are unable to outperform the broader market, there are studies that counter those findings. Bauer et al. (2010) recorded the equity returns of U.S. pension funds and concluded that pension funds were able to outperform their benchmarks by generating positive alpha. In their study of the returns of 463 defined benefit pension funds from 1997-2006 and 248 defined contribution

pension funds from 1990-2006, they noted that defined benefit funds and defined contribution funds generated an average alpha of 1.32% and 1.40% per year, respectively (Bauer et al., 2010). The fact that these funds have generated positive alpha, outperforming their respective benchmarks through security selection, is in stark contrast what would be expected under the EMH. Though the time differences and sample sizes between these studies are notable, the data is still significant. While most of the previous studies recorded general underperformance among pension and mutual funds, 26% of pension funds (Lakonishok, 1992) outperformed the S&P 500 and 30% of domestic equity mutual funds outperformed the S&P 1500 composite index (Liu, 2020). Though most studies presented thus far have supported the EMH, Bauer et al. (2010) and several others provided evidence that sheds light on defects within the EMH.

Anomalies of the Efficient Market Hypothesis

Though many studies provide evidence to support the validity of the EMH, there is a growing belief within the finance community that market rationality and efficiency does not always hold (Lo, 2017). As Lo (2017) stated, “Even though most economists have known for years that the Efficient Markets Hypothesis isn’t an accurate description of market behavior, they’ve continued to use it because they have nothing strong to replace it” (p. 206). In fact, there are actually theories that prove markets cannot be efficient because, if they were, no one would have a reason to trade based off of information; therefore, if markets were truly rational, they would quickly dissolve because of lack of interest (Lo, 2017). However, there are market anomalies that have been discovered by researchers that demonstrate how information can help investors outperform the market; these anomalies allow investors to exploit information to outperform the market (Jordan et al., 2018). Several of the market anomalies that have been recorded consist of the January Effect (De Bondt & Thaler, 1985, 1987), the Monday Effect (French, 1980), the Value

Factor (Hsu et. al., 2016), and the predictability of market returns based on news articles (Tetlock, 2007). These market anomalies provide further evidence of market inefficiencies and illuminate not only how markets become inefficient, but also when they become inefficient. According to the semi-strong and weak forms of the EMH, no public information or historical price trends should contribute to investors outperforming the broader market.

De Bondt and Thaler (1985) studied the overreaction hypothesis, which asserts that markets tend to overreact to both good news and bad news, on stocks traded on the New York Stock Exchange from the beginning of 1926 to the end of 1982 to determine if there was any predictability following these overreactions. The researchers found that, in the thirty-six months following a significant change in stock price, poor performing companies outperformed the market by 19.6% and strong performing companies underperformed the market by 5.0% (De Bondt & Thaler, 1985). Other pieces of work, such as those by De Bondt and Thaler (1987), Fama and French (1986, 1988), Howe (1986), Chan (1987) and others, found information similar to that which was found in De Bondt and Thaler's (1985) study. These researchers also investigated the returns of value investments and found a similar predictability. De Bondt and Thaler (1985) found that value stocks typically grow 25% more than growth stocks following a significant change in price. Doukas et al. (2004) found a similar trend among value stocks and discerned that they have higher returns because there is greater disagreement among financial analysts and investors about these companies' future payoffs relative to stock factors, such as growth or momentum. Similar to the value anomaly, there are also anomalies exploiting quality and momentum stocks.

Romahi et al. (2018) noted the behavioral aspects of various stock factors in their study of the momentum, quality, and low-volatility factor. As described by Romahi et al. (2018), the goal

of the momentum factor is to profit on investments by going long on assets that have been rising in price and by shorting assets that have been falling in price (Romahi et al., 2018). This strategy is based on the human bias that investors tend to underreact to new information in the long-term and that, without a catalyst for change, prices will continue to rise (Romahi et al., 2018). While investing the momentum factor, Romahi et al. (2018) also studied the quality factor, which consists of stocks that appear to have better fundamentals relative to the markets but tend to provide lower returns compared to the overall market (Romahi et al., 2018). They noted that this factor can be exploited when investors flock to low quality stocks on the hope that they will significantly increase in value, also referred to as the lottery-ticket effect, which causes quality stocks to become undervalued (Romahi et al., 2018). Finally, the researchers measure the overperformance of low volatility stocks relative to high volatility stocks and concluded that investors tend to invest more in high volatility stocks in the hope that they will result in significant gains. As of result of this behavior, the valuation of low volatility stocks decreases and their future expected returns increases (Romahi et al., 2018).

Bryan (2019) noted that, though the momentum, the quality, the low-volatility, and other factors can out produce the market over time, investors can maximize their returns by investing in various factors during specific economic cycles. The author noted the results of *BlackRock's* study of factor timing methods, in which the researchers incorporated data on valuations, momentum, economic cycles, and dispersion data and found that all these elements, with varying degrees of significance, provided accurate information for predicting factor performance (Bryan, 2019). One of the most commonly used methods for timing factors is the economic cycle, which is used by *Oppenheimer* as well (Bryan, 2019). Both studies found that the factors that outperform during economic periods of recovery, expansion, slowdown, and contraction are

value and small cap; momentum, value, and small cap; quality and low volatility; and quality and low volatility, respectively (Bryan, 2019). This data can be simplified down to mean that stocks with low valuations and higher volatility outperform during market expansions, while stocks with low volatility and strong balance sheets outperform during market contractions. Although using the economic cycle proved to be a good indicator for future factor returns, there is, as previously mentioned, other economic and market data that can contribute to enhancing factor timing. While factors and market anomalies are still relatively new concepts, one of the original finding's that discounted market inefficiency was presented by Andrew Lo and Craig MacKinlay in the early 1980s.

Andrew Lo, along with his partner Craig MacKinlay, discovered a major flaw in the EMH. In their study of weekly stock market returns from 1962-1985, Lo and MacKinlay (1988) rejected the random walk model and explained that, "the rejection of the random walk cannot be interpreted as supporting a mean-reverting stationary model of asset prices, but is more consistent with a specific nonstationary alternative hypothesis" (p. 27). This is due to the fact they their "results showed that the variance of two-week returns was three times the variance of one-week returns, not twice the variance as predicted by the Random Walk Hypothesis" (Lo, 2017, p. 48). The relationship between the Random Walk Theory and the EMH is described by Jordan et al. (2018), where they said that, "random walk is related to the weak-from version of the efficient markets hypothesis because past knowledge of the stock price is not useful in predicting future stock prices" (p. 225). In plain English, the researchers suggested that asset prices have statistical relationships, such averages, variances, and covariances, that change over time; this is opposed to a stationary model, where the various relationships do not change over time and have a constant long-term mean and a constant variance independent of time

(Iordanova, 2020). If these two individuals are correct in their supposition that the variables involved in stock returns change over time in an unpredictable way, it would imply that the underlying forces driving the stock market are changing. Similarly, more recent studies have presented similar conclusions, such as those done by Urquhart and McGroarty (2016) and Verheyden, Moor, and Vanpée (2015).

Urquhart and McGroarty (2016) tested the predictability of stock returns for the S&P 500, FTSE 100, NIKKEI225, and EURO STOXX 50 from January 1990 to May 2014 by using three versions of the variance ratio test method. They found evidence suggesting that market return predictability fluctuates over time in each market; with some periods of significant market predictability and other times with no predictability (Urquhart & McGroarty, 2016). That can be interpreted to mean that market efficiency is not an all-of-nothing occurrence, but rather, that market efficiency evolves overtime (Urquhart & McGroarty, 2016). In their analysis of the weak form of the EMH, Verheyden et al. (2015) compared the daily performance of 272 mutual funds from July 1, 2004 to June 30, 2014 (Verheyden et al., 2015). They concluded that, similar to Urquhart and McGroarty (2016), the weak form of the EMH is a relative concept that fluctuates through time, changing because of temporary market distress and deviations from equilibrium (Verheyden et al., 2015). While the researchers confirmed that most mutual funds underperformed the market, they determined that market inefficiencies were a large cause of the underperformance (Verheyden et al., 2015). Fund that were able to outperform the market, however, did so by limiting losses during times of heightened inefficiency and profiting off of the subsequent recovery (Verheyden et al., 2015). The main force of this market volatility is humanity, impacting market inefficiency because of humanity's various inherent behavioral heuristics.

Behavioral Finance and Human Irrationality

Based on the evidence presented by the previous studies, market rationality appears to not always hold, in which deviations from market efficiency are caused by humanity's investing behavior. Bernstein (2003) stated that his research "reveals repeated patterns of irrationality, inconsistency, and incompetence in the ways human beings arrive at decisions and choices when faced with uncertainty" (p. 91). All humans have biases that impact their investment decisions and influence market efficiency, specifically during periods of heightened market volatility. One of the first theories that sparked interest in the field of behavioral finance was proposed by Kahneman and Tversky (1979).

Kahneman and Tversky's (1979) research began by studying the utility theory; however, they proposed an alternative theory that is now considered to be a fundamental aspect of behavioral finance: Prospect Theory. Kahneman and Tversky (1979) used Prospect Theory to debunk the expected utility theory, which is where individuals strive to choose actions that result in the highest expected utility, and promote the idea that individuals are loss-averse because they dislike losses more than they like gains (Kahneman & Tversky, 1979). By simplifying prospect theory, it can be interpreted to mean that, given a choice of equal probabilities of success between increasing one's wealth and preserving one's wealth, they will prefer to elect to preserve their wealth. Prospect Theory provided a foundation for another theory that had many implications: risk aversion.

Hardin and Looney (2012) built off of the Prospect Theory and stated that investors will be more likely to succumb to loss aversion, which occurs when investors weigh losses more heavily than gains and when they review the returns of their assets over a short period of time, referred to as mental accounting. Mental accounting is the way in which humans frame

decisions; in the case of an investor, it would be considering the price of a stock over the short term as opposed to the long term (Hardin & Looney, 2012). Compared to safer assets, equities are riskier over the short-term and are more likely to experience periods of heightened volatility. However, when considering the returns of equities over a long time period, their returns are significantly higher than those of safe assets (Hardin & Looney, 2012). As the time frame of an investor decreases, the more likely they are to succumb to loss aversion; the opposite also applies, where investors with a long-term time frame are less likely to give in to loss aversion (Hardin & Looney, 2012). A combination of mental accounting and loss aversion, as described by Benartzi and Thaler (1993), is when investors are unwilling to bear the risks associated with holding equities because of loss aversion and mental accounting (p. 4). Because individuals are loss averse, the more often an individual reviews their portfolio, the more likely they are to sell their stocks and invest in lower risk securities, such as bonds or money market accounts (Benartzi & Thaler, 1993).

Neurological Characteristics

The primary sources that instigate market irrationality are fear and greed. Based on prior research, humans appear to have natural responses to financial loss and gain. In a study of the brain's reward system, Breiter (2001), along with the contribution of Kahneman, used functional magnetic resonance (fMRI) to discover how monetary gain and loss activated the brain (Lo, 2011). Participants were placed in a fMRI and tasked with playing a simple gambling game that had three potential outcomes; losing part or all of their money, retaining the same amount of money, or increasing the amount of money (Breiter, 2001). Each participant was given $50 to start with and the programming was designed so that each participant would generate earnings of $78.50 (Breiter, 2001). Breiter (2001) discovered that, as the monetary rewards grew, so did the

activation in the following parts of the brain: the nucleus accumbus, part of the reward system; the amygdala, associated with emotional responses; and the ventral tegmental area, which discharges dopamine into the reward system (Lo, 2011). Each of these previously mentioned components of the brain influence human's responses to various experiences.

Greed is fueled by dopamine that is released into the nucleus accumbens, the pleasure centers of our brains (Lo, 2011). The brains reward system, in which behaviors are established and reinforced, is controlled by dopamine when it experiences various stimuli such as money, sex, food, cocaine, methamphetamine, and other activities (Lo, 2011). Thus, when individuals gain money or possessions, dopamine is released into the nucleus accumbus, which results in a pleasurable neurological effect (Lo, 2011). Though the release of dopamine is neurologically pleasant, individuals are motivated by the mere anticipation of dopamine release, not just the after-effect (Wago et al., 2009). However, when people get what they want, financial success in this case, they subsequently want even more (Kets de Vries, 2016). These individuals need a bigger "hit" of financial success, producing more dopamine, in order to maintain the same "high" (Kets de Vries, 2016). For investors, this cycle of greed results in overconfidence, over trading, and poor due diligence, contributing to significant underperformance (Wago, et. al., 2009) However, due to the temporary high investors gets from making profits, they will continue to participate in this behavioral pattern, continually increasing the degree of potential financial risk and loss (Kets de Vries, 2016).

This psychological reward-system is the reason that Lo (2017) concluded that, at its most basic level, the Great Recession was caused because greed overpowered fear, as assets inflated to prices beyond their intrinsic value. Lo (2011) went on to explain that human's dopamine system often leads to greater-risk taking and, if risky financial undertakings are linked to monetary

increase, then a "potentially destructive positive-feedback loop can easily emerge from a period of lucky draws" (p. 14). Leading up to the Great Recession, investors were becoming greedy due to a strong market rally from the technology bubble of the early 2000s, causing investors to become over-confident and less skeptical of investment decisions (Kets de Vries, 2016). While greed has, in fact, contributed to severe market downturns and market irrationality, fear also has played a significant role in producing inefficiency and market declines.

Though the financial implications of investor greed are similar to that of fear, they operate behaviorally and neurologically in different ways. For example, people's reaction to financial loss is more extreme that their reaction to financial gain (Harley, 2016). Based on risk aversion, this is true, but there is a psychological element that this is attributable to (Hardin & Looney, 2012). Theoretically, if a stock declines 20% in one day, its investors would probably be tempted to sell that security regardless of what fundamental changes sparked this decline, but why? This example would trigger the part of the brain referred to as the amygdala, which is responsible for the brain's fear processing system (Ressler, 2010). Upon an event that induces fear related stimuli, such as fearful faces, fear inducing images, and fear conditioned cues, the amygdala begins to influence that brain's functionality; as it applies to finance, this could include fearful news articles and fear induced market selloffs (Ressler, 2010). Davis and Whalen (2001) noted that "the amygdala is especially activated under conditions of uncertainty" (p. 27). Referring back to the valuation anomaly, where low priced stocks experience higher returns in the future, Doukas et al. (2004) recognized that there is heightened uncertainty surrounding value stocks which activates investors amygdala's and induces a fearful reaction that causes investors to sell their assets, causing less demand and lower prices for these companies.

Typically, the prefrontal cortex is responsible for the "executive control" of the mind, as it sends and receives instructions from nearly all sensory and motor systems (Miller & Cohen, 2001, pp. 168, 193). However, when experiencing fear induced stimuli, the amygdala becomes activated and overrides the prefrontal cortex; typically, this happens without our conscious realizing it (Maren, 2001). Lo (2017) noted that the fear response in the brain "sidesteps" the functions of the prefrontal cortex, which is what we associate with human rationality (p. 82). Based on Pavlovian fear conditioning, the human amygdala's signal intensifies when exposed to stimuli that predicts an aversive event in the future (Davis & Whalen, 2001). Thus, humans need not currently be in a state of fear for the amygdala to regulate brain functioning, as a future event that produces fear will activate the amygdala's functioning over the brain; for investors, this could mean that, prior to a fear inducing event, investors may sell their riskier assets due to the fear of a fear producing event. Thus, when faced with this significant financial loss, the individual's amygdala processes the fear emotion that, all too often, causes individuals to sell this security in the spur of the moment. Consider the following example to understand the implication of the amygdala's function for investors in the stock market.

Using the previously example, assume the S&P 500 index falls 10% in one day. Using a psychological approach, many people's amygdalae would probably become activated and begin superseding the prefrontal cortex because of the significant losses that they were confronted with. The amygdala, in respond to this stimuli, would produce responses that would cause investors to sell their riskier assets because of the fear of additional losses. If this occurs on a large enough scale, this would cause the market to decrease significantly based on supply and demand, unless a great number of savvy investors take a contrarian approach and decide to buy. If the market falls below its inherent intrinsic value based on the information currently available

to investors, then the market is not being efficient. As the research in, "The Psychology of Investing" describes, "If we look at the S&P not just from one month to another, but over its 140+ year history, we see… there are long phases of deviation from the EMH. The largest deviations occur in times of speculative bubbles and crashes" *(*Nofsinger, 2017, pp. 27-28). Thus, this theoretical scenario appears to be more than just an example, it is what typically happens during stock market crashes.

Though the aforementioned example is extremely simplified and does not include many other factors, such as the economic impact of companies' current and future earnings, it does have wide-reaching implications for portfolio management. Events like the one described is what led Daniel Kahneman (2015) to conclude that, "'losses loom larger than gains' and that people are loss averse" (p. 284). Though selling during an initial downturn may prevent losses if losses continue, it could result in lost opportunity cost by not being invested when the stock market rebounds. Theoretically, if an investor could perfectly time the stock market, selling at the top and buying at the bottom would be ideal, however, Hsu et al. (2016), *Dalbar* (2019), and others suggest that timing the stock market in this fashion typically results in diminished performance.

Hsu, Myers, and Whitby (2016) documented the returns of mutual funds versus the returns of individuals using data from the CRSP Mutual Funds Database. The researchers found that, "although the buy-and-hold average returns for value mutual funds have outperformed the market portfolio, the dollar weighted average returns of these same fund meaningfully underperformed the market portfolio" (Hsu et al., 2016, p. 2). Their evidence suggests that investors invest money into value-based mutual funds right before periods of significant underperformance and liquidates their position before periods of strong performance (Hsu et al., 2016). While mutual funds focusing on value investments outperformed the S&P 500 index by

an average of 0.39% per year from January 1991 to June 2013, the average value investor in mutual funds underperformed the S&P 500 by 0.92% over the same time frame (Hsu et al., 2016). Over every mutual fund category, the researchers found that individual investors were giving up almost 2% per year because of poor market timing (Hsu et al., 2016). While it is possible that these investors have rational reasons to sell, Hsu, Myers, and Whitby's (2016) research suggests that individual mutual fund investors have significantly higher risk aversion than institution investors; this is the primary reason individual investors time the market poorly and, consequently, have lower returns (Hsu et al., 2016).

Dalbar, a financial market research firm that specializes in behavioral finance, conducted a study of investor returns compared with the S&P 500 index's from the end of 1995 to the end of 2015. Dalbar found that, while the S&P 500 index averaged annual returns of 9.85%, average investors had an average annual return of only 5.19% (Remsburg, 2019). Dalbar (2020) performed a similar study and found results that were similar to those previously mentioned. From 2000 to 2019, while the S&P 500 and Bloomberg Barclays US Aggregate Bond Index generated annual returns of 6.06% and 5.03% respectively, individuals in equities and fixed income securities realized annual returns of 4.25% and 0.47% respectively ("Don't Let Emotions", 2019). Kinnel, Kowara, Pham, and Strauts (2019) produced a similar report to that of Dalbar, in which they researched the difference between the annual returns of U.S. funds and those of individual investors from 2009 to 2018. While the primary findings of these studies were the same, the results were less dramatic in the Kinnel, Kowara, Pham, and Strauts's (2019) study. They found that the returns of U.S. fixed income and equity funds outperformed the returns of fixed income and equity investors by an average of 0.56% and 0.57% a year, respectively (Kinnel et al., 2019). Other researchers, such as Friesen and Sapp (2007) and Dichev

(2007), performed similar studies and found that individual investors underperformed by an average of 1.56% and at least 1.3% a year, respectively.

Though they might not be able to explain why, typically, the first thing that Wall Street Traders tell junior traders is to, "in the face of losses, fight the tendency to be too risk-seeking; and in the face of gains, fight the tendency to be too risk averse" (Lo, 2017, p. 60). The reason is because pride goes before a financial loss and because fear of losses causes losses (Burnham, 2008). Take, for example, one of the anomalies in the EMH, the valuation effect, and apply it to the previous example. The market begins to fall and people sell because they are scared of additional losses. However, in remembering that the valuation effect says that if a stock's valuations decrease, such as the price-earnings and price-book ratios, then those same stocks will likely outperform the market in the future. So, if this theoretical news sparks a market sell-off, but the company's earnings are still strong to the point where their price-earnings ratio is decreasing, then buying a variety of companies with falling price-earnings or price-book ratio's in the midst of the market's fear will, theoretically, exploit market inefficiency and produce a favorable future outcome. This reasoning is why Lo (2017) notes that current finance practitioners and academics refute the EMH but, due to a lack of a replacement, must still adhere to it. Consequently, in order to amend the flaws in the current way of thinking, Lo (2017) decided to create his own theory: the AMH.

Introduction to The Adaptive Market Hypothesis

The AMH takes into account market anomalies, periods of market inefficiency, and human behavior, explaining that humans' behavior, as previously mentioned, is the primary driver of market inefficiency or efficiency. Lo (2017) mentioned that the AMH, contrary to the EMH, does not imply that market efficiency is an "all-or nothing condition, but a continuum" (p.

279). Lo believed that this continuum of market efficiency is driven by the fact that humans learn and evolve from past experiences. Lo (2017) stated, “We display behavioral biases and make apparently suboptimal decisions, but can learn from past experience and revise our heuristics in response to negative feedback” (p. 188). When humans are operating irrationality and those irrational actions cause negative events, humans will learn from those occurrences and will develop from them. Market efficiency is particularly dependent on the relative proportion of market participants making investing decisions with their prefrontal cortexes, using a logical methodology, and those who use their amygdala to inform their investment decisions, a fear-based approach (Lo, 2017).

While the EMH supports the ideology that humans are rational, the AMH does not claim that humans are always irrational. While it is true that markets are often irrational due to various irregularities in human behavior, they are not always irrational (Urquhart & McGroarty, 2016). Humans become irrational when they are prompted by fear or greed to act in an illogical way. When humans do act irrationality, however, the effects of this irrationality can “compound across individuals, placing the wisdom of crowds with the madness of mobs” (Lo, 2017, p. 51). As previously mentioned, one of the main triggers leading up to the Great Recession was that greed overpowered fear (Lo, 2017). Because there was an increased amount of greed, and higher demand than supply, prices continued to increase and investors began overlooking the impending financial loss because of the potential for more financial gain. This is a very simplistic approach to the application of the AMH, but many in academia are testing this theory with much more complex, detailed scenarios.

One such study, by Urquhart and McGroarty (2016), tested the AMH proposed by Lo (2017) by analyzing the predictability of stock returns for the S&P 500, FTSE 100, NIKKEI225,

and EURO STOXX 50 (Urquhart & McGroarty, 2016). The researchers analyze these four popular indices from January 1990 to May 2014 by using three versions of the variance ratio test method (Urquhart & McGroarty, 2016). They found evidence that market return predictability fluctuates over time in each market, with some periods of significant market predictability and other times where there is no predictability (Urquhart & McGroarty, 2016). That can be interpreted to mean that market efficiency is not an all-of-nothing occurrence, but rather that market efficiency evolves overtime (Urquhart & McGroarty, 2016). The researchers conclude by confirming the claims of the AMH, that "markets adapt differently over time and interact differently to varying market conditions" (Urquhart & McGroarty, 2016, p. 48).

Another study, as presented by Fièvet and Sornette (2016), performed an exhaustive study of the FTSE, S&P 500, and CSI 300 indices from 1997-2015 and concluded that markets are efficient during all times except throughout periods of market crises, during which the EMH does not hold. In periods of market downturns, specifically during the dot-com bubble and the Great Recession of 2008-2009, the researchers conclude that the market does not adhere to the EMH and there are various areas of predictability that arise (Fiévet & Sornette, 2016). They also conclude that various behavioral heuristics influence investors behavior during periods of heightened volatility, especially investor herding to safe-haven assets; this creates systematic biases that allow investors to implement arbitrage strategies to generate alpha (Fiévet & Sornette, 2016). Additionally, Verheyden et al. (2015) describes markets through the lens of the AMH, saying that markets are efficient and rational most of the time, but there are times of market inefficiency caused by behavioral biases. Markets become inefficient when behavioral predispositions influence investors behavior and investors continue to compete with each other until a new equilibrium is formed (Verheyden et al., 2015).

Verheyden et al. (2015) concluded that markets are typically inefficient during periods of market downturn. The researchers performed an analysis evaluating the weak form of the EMH by comparing the daily performance of 272 mutual funds from July 1, 2004 to June 30, 2014 (Verheyden et al., 2015). The researchers conclude that the weak form of the EMH is a relative concept that changes through time, changing because of temporary market distress and deviations from equilibrium (Verheyden et al., 2015). While the researchers confirmed that most mutual funds underperform the market, they determined that market inefficiencies were a large cause of the underperformance (Verheyden et al., 2015). Fund that were able to outperform the market, however, did so by limiting losses during times of heightened volatility and profiting from the subsequent recovery (Verheyden et al., 2015).

These studies proposed that market inefficiencies are a result of either market downturns or because of behavioral biases. As markets begin to perform poorly, either from poor economic results or poor future earnings growth, the associated news relating to market developments will likely induce a fear-producing response among investors. As this amygdala induced response causes investors to irrationally sell, markets will then, as result, become inefficient (Ressler, 2010). As Lo (2017) explains, for example, “The Adaptive Market Hypothesis tells us that, at the most basic level of the financial crisis, greed overwhelmed fear” (p. 319). Additionally, as Greenwald et al. (2001) said, investors are in the grip of behavioral biases that influence them to pay too much for growth companies with high expected earnings potential and too little for value companies with lower expected earnings potential.

The EMH explains what generally happens during periods of no volatility or when fear induced selling and greed induced buying is limited, however, it fails to explain market inefficiency when the market dynamics change because of behavioral biases. As Lo (2017) said,

"It's not hard to come up with simple rules of thumb to follow when the environment contains predictable elements", but what happens when the environment changes (p. 66)? Many behavioral biases are due to humanity's natural tendency to forecast and plan for the future in their current environment, it is assumed, however, that the environment will not change (Lo, 2017). When the market dynamics change, the uncertainty and fear of potential losses induces an irrational response that, as noted by *MFS Investment Management*, typically results in selling that results in weakened future earnings potential (Bernstein, 2003). Understanding the implications of human behavior on market efficiency is important, however, incorporating the concepts of behavioral finance and market inefficiency into an individual's investment management process can be extremely beneficial.

Using Behavioral Patterns as an Indicator

Behavioral heuristics among professionals and individual investors contributes significantly to their overall underperformance, however, investors can capitalize of these behavioral tendencies by being aware of their own biases. Intuitively, investors probably know to buy low and sell high, but they often do the opposite in practice. Based on the overall underperformance of investors from the *Dalbar* and *Morningstar* data, it is logical to conclude that it is difficult to outperform the broader market. When influenced by fear or greed inducing stimuli, investors struggle to make rational decisions. Thus, most investors should not seek to use behavioral heuristics to improve investment returns, but for those that understand the risks associated with investing during periods of market irrationality, it could prove to be profitable.

Though many of the strategies for exploiting market anomalies and market inefficiencies are available to the public, investors still tend to underperform the market; this is due to investors trying to time the market based on behavioral heuristics (Hsu et al., 2016). Because investors

have a difficult time watching their investments decrease in value during downturns and underperform the market during rallies, most investors should invest in a diversified portfolio that fits their risk profile and not actively monitor it, but perform a review periodically. In a typical buy and hold strategy, investors would buy a passive investment, such as an ETF, and hold it for several years; these forms of investments would likely perform very closely to the broader market, which is great for most investors who want to perform similar to the broader market. From January of 1871 to June of 2020 the S&P 500 index has had an compounded annual growth rate of 4.5% a year; investors who chose to invest in a low-cost investment vehicle tracking the S&P 500 would still experience modest returns without dealing with the hassle of trying to time the market (Shiller, 2020). However, for investors who control their emotions and have a higher risk tolerance, it may be possible to exploit market inefficiencies by implementing a variation of the "buy-the-dip investment" strategy.

Buy-The-Dip Strategy

Yan et. al. (2020), in their analysis of long-term stock market returns, said that "if we conclude that the market will act similarly to how it has in the past, then we can assume that there will be short term stock decreases but increases in the long term" (p. 2). Ning (2018) performed a study evaluating the impact that declines had on future returns on the stocks in the Russell 1000 index from 2002 through 2016. They documented the returns on securities that fell more than 10% relative to the broader market index and found that these securities produced cumulative excess returns, also known as alpha, of 0.47% after one day and 28% after 240 days (Ning, 2018). Additionally, companies that have the lowest valuation tend to higher excess returns than those with higher valuations (Ning, 2018). Thus, investors who sold their stocks after periods of significant market volatility would have missed out on significant market gains,

while those who had invested when the market performed poorly would have outperformed the historical return of the S&P 500, not accounting for dividends (Ning, 2020). While this could be a potentially promising strategy for investors, it still requires much more research before it should be implemented.

Based on prior research, markets and investments are generally considered to be inefficient when they are trading either above or below their inherent intrinsic value; these would be characterized by heightened levels of greed and fear, respectively. However, monitoring stock valuations and macroeconomic conditions is typically unfeasible for individual investors. Thus, based on the aforementioned details and implications of behavioral finance, the best time to buy is when one is the most scared of losing money in the market. While this sounds very illogical, as an individual investors, many other investors will likely experience the same emotional reaction to severe market downturns; the difference is that they will miss out on the subsequent upside, while investors buying in the midst of fear would be capitalizing on the following market rebound. It is important for the investor, however, to determine if they can handle the potential risks associated with this type of strategy and can maintain this strategy over the long-term.

Biblical Integration

Understanding the correlation between the EMH and behavioral finance allows investors to understand how and when markets experience inefficiencies, allowing them to capitalize on other investor's irrational behavior. While this strategy could prove to be profitable for some, it is critical to realize one's goals when determining an investment strategy. Exploiting market inefficiencies is not designed to be a "get rich quick" strategy; Proverbs 21:5 states that "[t]he plans of the diligent lead to profit as surely as haste leads to poverty" (*New International* Version, 1978/2011, Proverbs 21:5). Also, investors should realize that "godliness with

contentment is great gain. For we brought nothing into the world, and we can take nothing out of it" (*New International* Version, 1978/2011, 1 Timothy 6:6-7). Kets de Vries (2016) put it this way: "the happiest people are not the ones with the best or most things, but those who appreciate what they have" (p. 17). Being good stewards of what we have been given, we should not seek to lay up treasures on Earth, but to be generous with the provisions God has given us; as "Do not lay up for yourselves treasures on earth… but lay up for yourselves treasures in heaven… For where your treasure is, there your heart will be also (*English Standard* Version, 2011, Matthew 6:19-21).

Conclusion

By understanding the underpinnings of stock market efficiency and inefficiency through the EMH, as well as psychology and a little bit of neuroscience, it is possible to produce a strategy that could outperform the broader market on a consistent basis. Comprehending how humans respond to fear and what influences their decisions in times of uncertainty can inform investors decisions about when to buy and what to buy. Based on prior research, one of the most straightforward ways to generate excess return is to buy during widespread selloffs, which is when it is the most difficult psychologically to buy stocks (Lo, 2017). Thus, by purchasing bonds until a market selloff, in which the investor would sell their bonds and buy stocks, it is possible for the investor to outperform the broader market. While this strategy has not been tested accounting for the impact of bonds in an investor's portfolio, prior research suggests that even a typical buy-the-dip strategy has the potential to outperform the broader market (Yan et. al., 2020). As such, considering the effect that human psychology and behavior has on investment decisions can serve to not only inform investors, but to give them insight into how to time investment purchases.

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