Behavioral Finance, Investor Psychology Perspective

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Abstract

Determining the fair value of financial assets has been a controversial subject since the 1990s, and whether this value depends only on fundamentally calculated pricing models or if there are other psychological factors that affects it. The field of behavioral finance addressed these issues and provided some asset pricing models that incorporate behavioral aspects of decision-making and explained the different heuristics and biases behind these market reactions that lacked fundamental explanation. Behavioral finance is a relatively new paradigm that emerged to try to fill in the gaps in "Modern Finance". Behavioral finance models did not develop specific strategies to beat the market, however, it has highlighted lots of argumentative ideas that have promising directions of further research and analysis that may be very useful in public policy and welfare analysis, as well as in wealth management.

In this paper, the author is presenting some of these behavioral finance theories and how they tackle the psychological aspects in investors’ rational and irrational investment decisions.

JEL classification numbers: P33, P45

Keywords: Finance, investors, public policy, wealth management

1 Introduction

The Efficient Markets Hypothesis dominated the center stage of Finance Theory in the 1970’s. Anomalous evidence that could not be fully accounted for by this hypothesis started showing up in 1980’s in the literature. During the same period, advancements had been made in psychological theories, questioning the behavior of rational economic agents, but without necessarily applying them to investor behavior in financial markets. This, however, led to some literature attempting to explain anomalous evidence from a psychological viewpoint, but not in a formal way. In the 1990’s, the development of financial economic models inspired by the psychology literature on behavioral biases and

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Article Info: Received : March 15, 2014. Revised : March 30, 2014. Published online : June 1, 2014
heuristics introduced the Behavioral Finance approach to the analysis of financial markets. In fact, the decade witnessed the development of a large body of behavioral finance literature.

Looking into stock market crash in 1987, the internet bubble in 2000 and the financial crisis in 2008-2009, it is worth questioning the prices of these financial assets and whether value is the same thing as price. On the one hand, we could assume that these assets have a fundamental value that can be derived through various models and techniques of valuations based on the expected future cash flow, and that this value determines the asset prices. On the other hand, we could simply assume that the value of an asset is nothing but the price at which it can be sold at any given point in time.

The field of behavioral finance addressed these issues and provided alternative asset pricing models incorporating behavioral aspects of decision-making and explained the different heuristics and biases behind these market reactions that lacked any fundamental explanation.

Behavioral finance is a relatively new paradigm that emerged to fill in the gaps in "Modern Finance". This gap reflects the failure of modern finance in which behavior was assumed to be derived by standard rational behavior rather than the psychologically impacted error-prone human behavior.

Statman (2010) pointed out that modern finance is built on the ground of rational behavior, and rests on four main building blocks, firstly, the "Mean-variance Portfolio Theory" of Markowitz (1952), the "Arbitrage Process" developed through the "Dividends Irrelevance proposition" of Miller and Modigliani (1961), thirdly, the CAPM developed through the work of Sharpe (1964) and Lintner (1965 a and b), and finally, the "Efficient markets Hypothesis" of Fama (1970). Statman (1999) pointed out that these gaps or soft spots are related to the very basic building blocks of modern finance.

2 Efficient Market Hypothesis

“The EMH is a consequence of equilibrium in competitive markets with fully rational investors” Shleifer 2000.

In his 1900 dissertation on "The Theory of Speculation," Louis Bachelier searched for a formula which expresses the likelihood of a market fluctuation.” He ended up with a mathematical formula that describes the Brownian Motion.

In the finance world, Brownian Motion came to be called the random walk, once described as the path a drunk might follow at night in the light of a lamp post and that means the probability of a rise in price at any moment in time is the same as the probability of its fall.

The estimation of the value of an investment is not, however, the only problem facing investors. Instead, they need to look at the overall level of risk exposure that holding different portfolios of several stocks entails an idea which Markowitz’s (1952) portfolio selection study gets at. His analysis of efficient portfolios, based on maximizing return for any given level of risk enables the identification of the efficient frontier, which is the trade-off between the expected return and risk. The personal profile of investors would then determine which point they would be on, on the efficient frontier. This implies that the ‘optimal portfolio’ is not the same across investors; because of the different utility functions they may have for risk exposure.

Fama (1970) draws on the implications of the CAPM and on the random character of the
stock market in establishing the foundations for the Efficient Markets Hypothesis. According to this hypothesis, the equality of the risk-adjusted returns, derived from the CAPM equilibrium condition, implies that the market price is the best estimate of an asset’s fundamental value. This is because the market price reflects the expected future returns on an asset, after adjusting for the systematic risk that is captured by its level of covariance with the return on a portfolio that is representative of the market as a whole. This means that superior returns could not be extrapolated neither from looking at historical prices, nor at current ones (weak and semi-strong efficiency). This is because any new private and public information about expected returns get reflected in the asset prices when they come out. This makes it impossible to consistently achieve abnormal returns (strong form efficiency) because the changes in the prices are based on the changes in the available information, which evidently do not rely on historical information or on present information. Thus, stock prices may be looked at as following a random walk, represented by arbitrary changes in available information, just as Bachelier had suggested over a hundred years ago.

In fact, the theory argues that investors are rational and trade only based on changes in available information. In the case that irrational investors exist in the marketplace, their different trading strategies are likely to cancel out each other. Moreover, the rational investors would exploit any discrepancies caused by the irrational investors, so that the mispricing would not persist and there would be “no free lunches,” as prices get driven back to their fundamental values, so that eventually the CAPM equilibrium condition prevails. In fact, Friedman (1953) argues that the irrational investors are most likely to buy high and sell low, which means that eventually their wealth depletes and they disappear from the market, so that ‘in the long run market efficiency prevails because of competitive selection and arbitrage’ (Shleifer 2000).

3 Empirical Challenges to the EMH

Shiller (1981) provides evidence of excessive stock prices’ volatility that could not be explained by efficient markets models such as the Dividend Discount model. The diagram below shows that the expected prices based on subsequent earnings follow a smooth trend whereas actual prices are highly volatile. This makes the case for the efficient markets weak, because the prices do not reflect the fundamental value of the stocks represented by their expected future earnings.
He then argues that such evidence against the efficient markets is what gave rise to the behavioral finance discipline, which he defines as “finance from a broader social science perspective including psychology and sociology” (Shiller 2003). He summarizes the advances in behavioral finance through looking at the positive feedback models and the smart money models. The former is based on price speculation, which is what causes bubbles, as was the case with the tulip mania in the 17th century, when people started trading in tulips and making huge profits on the trade and then they began to believe that someone must lose his money in the end, making it a self-fulfilling prophecy that eventually made tulips worthless. This framework could be applied to other types of markets, such as the stock market and the housing market. In fact, the most recent internet boom of the millennium and the housing boom that followed represent remarkable examples of the positive feedback framework, in which overexcitement about the prospect of positive returns from investments promote speculative trading and make future prices predictably positive. The latter is based on the assumption of the existence of two different groups in the market; noise traders, who distort market efficiency due to their irrational behavior and smart money traders who regulate market inefficiencies by exploiting arbitrage opportunities.

Ritter (2003) stated that not all miss valuations are caused by psychological biases, however. Some are just due to temporary supply and demand imbalances and he emphasizes on that matter by the fact that when Yahoo was added to the S&P 500 in December 1999, index fund managers had to buy the stock even though it had a limited public float. This extra demand drove up the price by over 50% in a week and over 100% in a month. Eighteen months later, the stock price was down by over 90% from where it was shortly after being added to the S&P. These supply and demand phenomena might push stock prices far from their far value in either direction.

Further contradictory evidence to the market efficiency theory shows on Ikenberry, Lakonishok and Vernaeleen (1995) as they show that the market under-reacts to open market share repurchases so that significant returns are not realized for buy-and-hold
investors. They find that the market's initial reaction to the announcement stands at 3.5% on average, which is not much different than the average daily price standard deviation of most stocks. The empirical evidence thus implies that the strong/semi-strong forms of market efficiency are not manifested in share buybacks as we would have seen significant price surges following share buyback announcements (signaling theory) had the latter been true. This lends further evidence to investor behavior being psychologically impacted and not fully rational in the market efficient sense.

4 Behavioral Portfolio Theory

In contrast to the mean-variance portfolio theory, empirical evidence does not support that investors hold well diversified efficient portfolios. Campbell (2001) found out when studying the U.S stocks; a clear tendency for correlations among individual stocks to decline over time. Correlations over five years of monthly data declined from 0.28 in the early 1960s to 0.08 in 1997. Statman (2010) pointed out that the current optimal diversification level, as prescribed by mean-variance optimizations should exceed 300 stocks, because at this level of diversification the benefits exceeds the costs. Yet, Goetzmann and Kumar (2001); in a study of more than 40,000 stock accounts at a brokerage firm found out that the mean number of stocks in a portfolio in the 1991-1996 period was 4 and the median number is 3.

In the same vein, Polkovnichenko (2003) found also in a survey of 14 million households in 1998 that they were holding portfolios of 1 to 5 stocks. What is more, there is evidence that supports the concentration of portfolios in particular styles, such as large capitalization stock, or locations whether regional or national.

Shefrin and Statman (1999) developed behavioral portfolio theory as an alternative to the descriptive version of the Markowitz mean–variance portfolio. Mean–variance investors evaluate portfolios as a whole; they consider co-variances between assets as they construct their portfolios. Mean–variance investors also have consistent attitudes toward risk; they are always averse to risk.

Shefrin and Statman explain how BPT is consistent with the apparently irrational behavioral tendency of many people to purchase insurance policies and also buy lottery tickets. A BPT investor maximizes expected wealth subject to the constraint that the probability of wealth being less than some aspirational level cannot exceed some specific probability. The investor can tolerate failure to achieve at least the aspirational level of wealth but only with a small probability. In other words, the investor maximizes expected wealth on a particular portfolio subject to safety constraint.

This phenomena was clearly addressed in the Security, Potential and Aspiration (SPA) Theory by Lopez and Oden, it emphasizes that the decision maker when choosing among risky investment aims at maximizing security, potential and aspiration, yet in some situations the investor is willing to trade off some security and potential in exchange for high aspiration value.

The decision maker who experience greater fear faces sharp reduction in security, where the investor with greater hope will have high probability of the occurrence of the favorable event. As a result hope is tied to the upside potential and the degree to which hope and fear are expressed in choices depends on the prospects offer of security and potential.
Accordingly, Behavioral investors build portfolios as pyramids of assets, layer by layer. The layers are associated with particular goals and particular attitudes toward risk. Some money is in the downside-protection layer, designed to avoid poverty; other money is in the upside-potential layer, designed for a shot at being rich.

5 Bounded Rationality

Simon (1957) proposed the notion of bounded rationality, recognizing that people are not fully rational when making decisions and do not optimize but rather satisfice (satisfy and suffice) when arriving at a decision. Simon describes the phenomenon where people gather some not all available information, use heuristics to make the process of analyzing information and stop when they have arrived at a satisfactory decision and not necessarily the optimal one, that in contrast with the rational economic man making decisions according to the expected utility theory.

On the basis of his research in business organizations, Simon (1947) observes that when faced with a problem requiring a decision managers frequently do not have the resources (including time) to identify all possible courses of action, to evaluate each course of action against all relevant criteria, and to choose the best alternative for implementation. While rational, human beings only have a limited capacity to gather, store, process and understand.

Decision makers may choose to satisfice rather than optimize because the cost and time of finding optimal solution can be very high. People set constraints as to what will satisfy their needs. Simon refers to these constraints as aspiration levels.

6 Prospect Theory

Kahneman and Tversky (1979) introduced the prospect theory as an alternative to the expected utility theory; it explains how individuals make choices between alternatives that involve risk and how they evaluate potential losses and gains. The findings emphasized that people tend to strongly prefer avoiding losses as opposed to achieving gains and that leads to a new behavioral understanding of investors that they are loss
averse to a great extent as opposing to the original utility theory with all its developments that refers to investors are risk averse. McMahon (2005) stated that the chief attraction of prospect theory to BF scholars is its ability to accommodate heuristics and cognitive biases evidenced in real world decision-making that simply are not countenanced in expected utility theory. Thaler and Johnson’s (1990) research stems from the same belief of the Prospect Theory that choices are not only influenced by their net effect on wealth, but rather by how they are perceived as gains or losses relative to a reference point. However, their results suggest an inverse S-shaped value function to that of the Prospect Theory. They find that, contrary to the Prospect Theory; prior losses make people more risk averse, especially when the second choice does not offer the opportunity to break even. Similarly, with prior gains, people become more risk seeking because of the House Money Effect, which implies that people will continue to take risks as long as they are losing the money they had gained and not their own money. This effect may diminish as the size of the potential loss approaches the initial stake. However, this effect is only observed with two-stage formulations of choices, whereas with the one-stage formulation, the prospect theory is at work. Also, when a choice following a loss offers the chance to break even, it is likely that people will manifest risk-seeking attitudes as is predicted by the Prospect theory and this effect is named the Break Even Effect.

Loughran and Ritter (2002) tried to explain the severe underpricing of some IPOs in the article “Why Don’t Issuers Get Upset about Leaving Money on the Table in IPOs?”. If an IPO is underpriced, pre-issue stockholders are worse off because their wealth has been diluted. They argued that if an entrepreneur receives the good news that he or she is suddenly unexpectedly wealthy because of a higher than expected IPO price, the entrepreneur does not bargain as hard for an even higher offer price. This is because the person integrates the good news of a wealth increase with the bad news of excessive dilution. The individual is better off on net. Underwriters take advantage of this mental

Figure 3: Loss aversion diagram
accounting and severely underprice these deals. It is these IPOs where the offer price has been raised (a little) that leave a lot of money on the table when the market price goes up a lot.

7 Limited Arbitrage Models: Smart Money and Positive Feedback

“Arbitrage is a double edged-blade: Just as rational investors arbitrage away inefficient pricing, foolish traders arbitrage away efficient pricing” Hirshleifer (2001). The literature provides possible explanations for the empirical observations that prices do not always reflect the assets’ fundamental values, and so the efficiency condition is often violated in the marketplace. These behavioral finance models employ the noise trader approach but do not go into psychological specifications of investor behavior. This approach allows for the existence of pseudo-information (false and fake) in the market, which may cause investors to trade for reasons unjustified by the actual information at a certain point in time. The idea was first advanced by Black (1986), who suggested that prices could be not only reflects the information of rational investors, but also the pseudo-information of noise traders. He also suggested that arbitrage could be limited because gains are not guaranteed.

This framework of analysis assumes that there are two types of traders in the marketplace: the noise traders and the arbitrageurs. The noise traders are the irrational traders who respond to pseudo-information and cause prices to deviate away from their fundamental values, thus distorting the market efficiency. The arbitrageurs are the market regulators who exploit the mispricing opportunities created by the noise traders and counter their effect, thus helping prices drive back to their fundamental values. However, in cases when it is in the interest of arbitrageurs to drive on the bandwagon along with the noise traders, rather than countering their behavior, they may behave sub-optimally and cause prices to deviate further away from their fundamental values. This framework provides a plausible explanation for the large trading volumes that form economic bubbles.

Ritter (2003) argued that there is no grantee that mispricing will be corrected with a reasonable time frame. Arbitragers that short the Japanese market in the late 1980 and the US market in 1990 lost huge losses before the prices adjusted after so many years. When trading against the noise traders, the arbitrageurs are faced with two types of risk; the fundamental risk that price deviations may reflect changes in information about expected future cash flows from a financial asset and the noise trader risk that the price deviations are caused by sub-optimal behavior of noise traders. However, in order to act against the mispricing, they need funds to engage in short-selling strategies, they need time because the mispricing might persist and they need to find substitute portfolios to buy the relatively cheap and sell the relatively expensive, so that the mispricing gets eliminated. These limitations pose restrictions on arbitrageurs’ actions. Thus, their demand for underpriced stocks will be limited, especially that the lending of financial assets is often conditional on liquidating positions within a certain time period, which may not be long enough for the arbitrageurs’ to realize the desired returns on their risk-taking (Shleifer and Vishny 1997). In addition, risks are often entailed with selling overvalued stocks, because there are possibilities that their prices would rise further. Thus, the determination of the perfect timing of short selling is risky and difficult, which may prevent arbitrageurs’ reactions from driving prices all the way down to fundamentals. Also, in the case of stocks, it is unlikely for arbitrageurs to find close substitutes for
Behavioral Finance, Investor Psychology Perspective

mispriced assets and this implies the absence of a riskless hedge for arbitrageurs (Shleifer and Vishny 1997).

De Long, Shleifer, Summers and Waldmann (1990) argue that noise traders are likely to survive in the marketplace and not disappear as a result of losing their money from inefficient trading as had been argued by Friedman (1953). This is because their overconfidence or optimism might cause them to trade more aggressively, and take on more risks, which would then be rewarding. They are also less likely to learn from their mistakes because their strategies might be imitated, which then enlarges their overall effect on the market. Also, we know that new investors enter the market all the time and they are prone to the same behavioral biases that result in sub-optimal rationality as the preceding generations of investors. The model assumes the noise trader risk to be systematic across the market, because they are most likely to be subject to the same erroneous beliefs and it assumes arbitrageurs to have short investment horizons due to the agency and liquidity problems discussed above. According to these assumptions, arbitrageurs may not be able to drive the prices back to fundamentals, and their ability to do so decreases the farther away prices are from fundamental values.

8 Behavioral Approach to Asset Pricing

Shefrin and Statman (1994) started to develop an alternative to the classic capital asset pricing model (CAPM). Shefrin (2005, 2008) develops the idea further and proposes a behavioral approach to asset pricing using models which Shefrin terms behavioral stochastic discount factor based asset pricing models. He concluded that investors do not make their decisions in an unbiased way. The stochastic discount factor to reflect this bias is a function of investor sentiment relative to fundamental value. The models focuses on market sentiment as a major determinant of asset pricing, which in turn is derived from systematic errors in judgment committed by investors. Shefrin asserts that sentiment causes asset prices to deviate from values determined using traditional finance approaches.

In order to have a tractable behavioral approach to asset pricing, it is necessary to have a well-defined measure of sentiment with an impact that can be traced on market prices and risk premiums. Shefrin (2005) proposes that the dispersion of analysts’ forecast serves as a proxy for the sentiment risk premium in the model. In support of this theory, he cites Ghysels and Juergens (2004) who determine that dispersion of analysts’ forecasts is statistically significant in a Fama-french multi-risk-factor framework. Alternatively, the dispersion of analysts’ forecasts may be a systematic risk factor not accounted for by other factors in the model. Doukas, Kim, and Pantzalis (2004) find that value stocks earn higher returns than growth stocks because the dispersion of analysts’ forecasts is greater for value stocks-which support dispersion of opinion as a measure for source of risk.

Shefrin develops a stochastic process for sentiment and a fundamental SDF-based asset-pricing equation. The price of an asset is the expected value of its discounted payoffs. The discount rate captures the effects of the time value of money, fundamental risk, and sentiment risk. Sentiment pertains to erroneous, subjectively determined beliefs. If an investor’s subjective beliefs about the discount rate match those of traditional finance, the investor is said to have zero risk sentiment. If an investor’s subjective beliefs about the discount rate do not match those of traditional finance, the investor’s beliefs are said to include risk sentiment. Thus, the discount rate on a security is the sum of the
Ahmed Ibrahim Mokhtar

risk-free rate and fundamental premiums (reflecting sentiment-based risk).
Although Shefrin cites evidence that investors commit errors that result in inefficient
prices in the aggregate, it is important to determine if these errors are either systematic or
essentially random in nature. If they are systematic, the errors may be predicted and
exploited to earn excess returns. A logical assumption, in that case, is that rational and
informed investors—however few in number—would act on these inefficiencies and thereby
limit the scope of the pricing errors. If investors’ errors are random in nature, however,
then observing and modeling them presents a formidable challenge, as indicated in the
original work by Shefrin and Statman (1994).

9 Cognitive Errors and Emotional Biases

The behavioral biases are classified as either cognitive errors or emotional biases. This
distinction is not only simple and easily understood, but it also provides a useful
framework for understanding how effectively can be corrected for. If we think of decision
making as occurring along a spectrum from the totally rational decision making of
traditional finance to purely emotional decision making, cognitive errors are basic
statistical, information-processing, or memory errors that cause the decision to deviate
from the rational decisions of traditional finance. Emotional biases arise spontaneously as
a result of attitudes and feelings that can cause the decision to deviate from the rational
decisions of traditional finance.

Cognitive errors are more easily corrected than emotional biases. Individuals are better
able to adapt their behaviors or modify their processes if the source of the bias is logically
identifiable, even if not completely understood. For instance, an individual may not
understand the complex mathematical process to update probabilities but may
comprehend that the process initially used was incorrect. Cognitive errors can also be
thought of as “blind spots” or distortions in the human mind. Cognitive errors do not
result from emotional or intellectual predispositions toward certain judgments, but rather
from subconscious mental procedures for processing information. Because cognitive
errors stem from faulty reasoning, better information, education, and advice can often
correct for them. Thus, most cognitive biases can be “moderated”- to moderate the impact
of a bias is to recognize it and attempt to reduce or even eliminate it within the individual.

Emotional biases stem from impulse or intuition—especially personal and sometimes
unreasoned judgments they are less easily corrected. It is generally agreed that an emotion
is a mental state that arises spontaneously rather than through conscious effort. Emotions
are related to feelings, perceptions, or beliefs about elements, objects, or relations
between them and can be a function of reality or the imagination. In the world of
investing, emotions can cause investors to make suboptimal decisions. Emotions may be
undesired by the individual feeling them; he or she may wish to control them but often
cannot, thus, it may only be possible to recognize an emotional bias and “adapt” to it.
When a bias is adapted to, it is accepted and decisions are made that recognize and adjust
for it (rather than making an attempt to reduce or eliminate it).

The cognitive-emotional distinction will help us determine when and how to adjust for
behavioral biases in financial decision making. However, it should be noted that specific
biases may have some common aspects and that a specific bias may seem to have both
cognitive and emotional aspects. Researchers in financial decision making have identified
numerous specific behavioral biases.
10 Cognitive Errors

10.1 Belief Perseverance Biases
Belief perseverance biases are closely related to the psychological concept of cognitive dissonance. Cognitive dissonance is the mental discomfort that occurs when new information conflicts with previously held beliefs or cognitions. To resolve this dissonance, people may notice only information of interest (selective exposure), ignore or modify information that conflicts with existing cognitions (selective perception), or remember and consider only information that confirms existing cognitions (selective retention). Aspects of these behaviors are contained in the biases categorized as belief perseverance.

10.2 Conservatism Bias
Conservatism bias is a belief perseverance bias in which people maintain their prior views or forecasts by inadequately incorporating new information. This bias has aspects of both statistical and information-processing errors. Academic studies have demonstrated that conservatism causes individuals to overweight initial beliefs about probabilities and outcomes and underreact to new information; they fail to modify their beliefs and actions to the extent rationally justified by the new information. In Bayesian terms, they tend to overweight the base rates and underweight the new information, resulting in revised beliefs about probabilities and outcomes that demonstrate an under reaction to the new information. As a result of conservatism bias, Financial Market Participants may underreact to or fail to act on new information and continue to maintain beliefs close to those based on previous estimates and information.

10.3 Confirmation Bias
Confirmation bias is a belief perseverance bias in which people tend to look for and notice what confirms their beliefs, and to ignore or undervalue what contradicts their beliefs. This behavior has aspects of selective exposure, perception, and retention and may be thought of as a selection bias. It is an all too natural response to cognitive dissonance and reflects an ability to convince ourselves of what we want to believe by giving more weight to evidence that supports our beliefs and to ignore or modify evidence that conflicts with our beliefs.
Numerous studies have demonstrated that people generally place excessive weight on confirmatory information; that is, they place greater weight on information that supports their beliefs. Information is considered positive if it supports their beliefs and negative if it fails to support or refutes their beliefs. Thomas Gilovich, a researcher in the field of human psychology, notes that “The most likely reason for the excessive influence of confirmatory information is that it is easier to deal with cognitively.” Researchers are sometimes guilty of confirmation bias when they set up experiments or frame their data in ways that tend to confirm their hypotheses. They compound the problem by proceeding in ways that avoid dealing with data that would contradict their hypotheses.
10.4 Representativeness Bias

Representativeness bias is a belief perseverance bias in which people tend to classify new information based on past experiences and classifications. They believe their classifications are appropriate and place undue weight on them. This bias occurs because people attempting to derive meaning from their experiences tend to classify objects and thoughts into personalized categories. When confronted with new information, they use those categories even if the new information does not necessarily fit. They rely on a “best fit” approximation to determine which category should provide a frame of reference from which to understand the new information.

10.5 Illusion of Control Bias

Illusion of control bias is a bias in which people tend to believe that they can control or influence outcomes when, in fact, they cannot. Langer (1983) defines the illusion of control bias as the “expectancy of a personal success probability inappropriately higher than the objective probability would warrant.” Langer finds that choices, task familiarity, competition, and active involvement can all inflate confidence and generate such illusions. For example, Langer observed that people permitted to select their own numbers in a hypothetical lottery game were willing to pay a higher price per ticket than subjects gambling on randomly similar situations, where people perceived themselves as possessing more control than they did, inferred causal connections where none existed, or displayed surprisingly great certainty in their predictions for the outcomes of chance events.

10.6 Hindsight Bias

Hindsight bias is a bias with selective perception and retention aspects. People may see past events as having been predictable and reasonable to expect. This behavior is based on the obvious fact that outcomes that did occur are more readily evident than outcomes that did not occur. Also, people tend to remember their own predictions of the future as more accurate than they actually were because they are biased by the knowledge of what has actually happened. To alleviate the discomfort associated with the unexpected, people tend to view things that have already happened as being relatively inevitable and predictable. This view is often caused by the reconstructive nature of memory. When people look back, they do not have perfect memory; they tend to “fill in the gaps” with what they prefer to believe. In doing so, people may prevent themselves from learning from the past.

11 Information-Processing Biases

The second category of cognitive errors includes information-processing errors or biases. Information-processing biases result in information being processed and used illogically or irrationally. As opposed to belief perseverance biases, these are less related to errors of memory or in assigning and updating probabilities and more to do with how information is processed.
11.1 Anchoring and Adjustment Bias

Anchoring and adjustment bias is an information-processing bias in which the use of a psychological heuristic influences the way people estimate probabilities. When required to estimate a value with unknown magnitude, people generally begin by envisioning some initial default number an “anchor” which they then adjust up or down to reflect subsequent information and analysis. Regardless of how the initial anchor was chosen, people tend to adjust their anchors insufficiently and produce end approximations that are, consequently, biased. This bias is closely related to the conservatism bias. In the conservatism bias, people overweight past information compared to new information. In anchoring and adjustment bias, people place undue weight on the anchor. People anchor and adjust because they are generally better at estimating relative comparisons than absolute figures.

11.2 Mental Accounting Bias

Mental accounting bias is an information-processing bias in which people treat one sum of money differently from another equal-sized sum based on which mental account the money is assigned to. Richard Thaler (1980) describes mental accounting as a process in which people code, categorize, and evaluate economic outcomes by grouping their assets into any number of non-fungible (non-interchangeable) mental accounts. This method contradicts rational economic thought because money is inherently fungible. Mental accounts are based on such arbitrary classifications as the source of the money (e.g., salary, bonus, inheritance, gambling) or the planned use of the money (e.g. leisure, necessities). According to traditional finance theory, Investors should consider portfolios holistically in a risk/return context.

11.3 Framing Bias

Framing bias is an information-processing bias in which a person answers a question differently based on the way in which it is asked (framed). How information is processed is dependent upon how the question is framed. In actual choice contexts, a decision maker has flexibility in how to think about a problem. A decision frame is the decision maker’s subjective conception of the acts, outcomes, and contingencies associated with a particular choice. The frame that a decision maker adopts is controlled partly by the formulation of the problem and partly by the norms, habits, and personal characteristics of the decision maker. It is often possible to frame a given decision problem in more than one way. Narrow framing occurs when people evaluate the information to make a decision based on a narrow frame of reference. People lose sight of the big picture and focus on one or two specific points.

11.4 Availability Bias

Availability bias is an information-processing bias in which people take a heuristic (sometimes called a rule of thumb or a mental shortcut) approach to estimating the probability of an outcome based on how easily the outcome comes to mind. Easily recalled outcomes are often perceived as being more likely than those that are harder to
recall or understand. People often unconsciously assume that readily available thoughts, ideas, or images represent unbiased estimates of statistical probabilities. People decide the probability of an event by how easily they can recall a memory of the event. The basic problem is that there are biases in our memories. For instance, recent events are much more easily remembered and available.

12 Emotional Biases

12.1 Loss-Aversion Bias

Loss-aversion bias was identified by Daniel Kahneman and Amos Tversky in 1979 while they were working on developing prospect theory. In prospect theory, loss-aversion bias is a bias in which people tend to strongly prefer avoiding losses as opposed to achieving gains. A number of studies on loss aversion suggest that, psychologically, losses are significantly more powerful than gains. When comparing absolute values, the utility derived from a gain is much lower than the utility given up with an equivalent loss. Rational Investors should accept more risk to increase gains, not to mitigate losses. However, paradoxically, Investors tend to accept more risk to avoid losses than to achieve gains. Loss aversion leads people to hold their losers even if an investment has little or no chance of going back up. Similarly, loss-aversion bias leads to risk avoidance when people evaluate a potential gain. Given the possibility of giving back gains already realized, Investors lock in profits, thus limiting their upside profits. Kahneman and Tversky describe loss-averse investor behavior as the evaluation of gains and losses based on a reference point. An important concept embedded in this utility representation is what Shefrin and Statman (1985) coined the disposition effect: the holding (not selling) of investments that have experienced losses (losers) too long, and the selling (not holding) of investments that have experienced gain (winners) too quickly. The resulting portfolio may be riskier than the optimal portfolio based on the risk/return objectives of the investor.

12.2 Overconfidence Bias

Overconfidence bias is a bias in which people demonstrate unwarranted faith in their own intuitive reasoning, judgments, and/or cognitive abilities. This overconfidence may be the result of overestimating knowledge levels, abilities, and access to information. For example, people generally do a poor job of estimating probabilities; still, they believe they do it well because they believe that they are smarter and more informed than they actually are. This view is sometimes referred to as the illusion of knowledge bias. Overconfidence may be intensified when combined with self-attribution bias. Self-attribution bias is a bias in which people take credit for successes and assign responsibility for failures are attributed to external factors. Overconfidence bias has aspects of both cognitive and emotional errors but is classified as emotional because the bias is primarily the result of emotion. It is difficult to correct for because the bias is primarily the result of emotion. It is difficult to correct for because it is difficult for people to revise self-perceptions of their knowledge: prediction overconfidence and certainty overconfidence. Both types have cognitive and emotional aspects; both types demonstrate faulty reasoning combined with “gut feel” and such emotional elements as hope. Hope frequently underpins the probabilities assumed when investment decisions are
Behavioral Finance, Investor Psychology Perspective

made in an overconfident state.

12.3 Self-Control Bias
Self-control bias is a bias in which people fail to act in pursuit of their long-term, overarching goals because of a lack of self-discipline. There is an inherent conflict between short-term satisfaction and achievement of some long-term goals. Money is an area in which people are notorious for displaying a lack of self-control, but it is not the only one. Attitudes toward weight loss, smoking, and studying provide other examples. When it comes to money, people may know they need to save for retirement, but they often have difficulty sacrificing present consumption because of a lack of self-control. The apparent lack of self-control may also be a function of hyperbolic discounting. Hyperbolic discounting is the human tendency to prefer small payoffs now compared to larger payoffs in the future; otherwise, people will not be willing to make current sacrifices. People seem to have temporal short-sightedness or temporal myopia, focusing on the present and discounting the future. They spend today rather than save for tomorrow. This behavior can lead to high short-term utility and disastrous long-term utility.

12.4 Status Quo Bias
Status quo bias, coined by Samuelson and Zeckhauser (1988), is an emotional bias in which people do nothing (i.e. maintain the “status quo”) instead of making a change. People are generally more comfortable keeping things the same than with change and thus do not necessarily look for opportunities where change is beneficial. Given no apparent problem requiring a decision, the status quo is maintained.

Status quo bias is often discussed in tandem with endowment and regret-aversion biases because the outcome of the biases, maintaining existing positions, may be similar. However, the reasons for maintaining the existing positions differ among the biases. In the status quo bias, the positions are maintained largely because of inertia rather than conscious choice. In the endowment and regret-aversion biases, the positions are maintained because of conscious, but possibly incorrect, choices. When endowment bias exists, ownership imbues an investment with intangible value beyond the true value to the holder. Endowment bias creates a preference for no change or the status quo. With regard to regret aversion, Investor presented with two investment choices may opt for the status quo rather than potentially experience the regret of selling shares that then went up in price. When status quo, endowment, and regret-aversion biases are combined, people will tend to strongly prefer that things stay as they are, even at some personal cost.

12.5 Endowment Bias
Endowment bias is an emotional bias in which people value an asset more when they hold rights to it than when they do not. Endowment bias is inconsistent with standard economic theory, which asserts that the price a person is willing to pay for a good should equal the price at which that person would be willing to sell the same good. However, psychologists have found that when asked, people tend to state minimum selling prices for a good that exceed maximum purchase prices that they are willing to pay for the same good. Effectively, ownership “endows” the asset with added value. Endowment bias can
affect attitudes toward items owned for long periods of time or can occur immediately when an item is acquired. Endowment bias may apply to inherited or purchased securities. Investors may irrationally hold on to securities they already own, which is particularly true regarding their inherited investments. For example, a child or grandchild may hold an outsized inherited stock position because of an emotional attachment, despite the risk of a sizable loss if the stock stumbles. These investors are often resistant to selling even in the face of poor prospects. Again using the example of an inheritance, Investor may hold an inherited municipal bond portfolio because of an emotional attachment, when a more aggressive asset mix may be more appropriate.

12.6 Regret-Aversion Bias

Regret-aversion bias is an emotional bias in which people tent to avoid making decisions that will result in action out of fear that the decision will turn out poorly. Simply put, people try to avoid the pain of regret associated with bad decisions. This tendency is especially prevalent in investment decision making. Regret aversion can cause FMPs to hold onto positions too long. They are reluctant to sell because they fear that the position will increase in value and then they will regret having sold it. Regret aversion can also keep Investors out of a market that has recently generated sharp losses or gains. Having experienced losses, our instincts tell us that to continue investing is not prudent. Yet periods of depressed prices may present great buying opportunities. Regret aversion can persuade us to stay out of the stock market just when the time is right for investing. On the upside, dear of getting in at the high point can restrict new investments from taking place. Regret bias can have two dimensions: actions that people take and actions that people could have taken. More formally, regret from an action not taken is called an error of commission. Regret may be distinguished from disappointment in that regret includes strong feelings of responsibility for the choice that has been made. Regret is more intense when the unfavorable outcomes are the result of an error of commission versus an error of omission. Thus, no action becomes the preferred decision.

11 Conclusion

This paper addressed the question of whether prices reflect fundamental values and whether deviations of prices from value could be explained solely by the efficient framework. Our review of the literature has shown that the EMH could not stand up to the empirical challenges to its semi-strong and strong market efficiency. Instead, we chose to explore the behavioral framework of analysis to market anomalies, adding a psychological dimension to finance. In fact, the cognitive errors and emotional biases play a major role in the investment decision-making process, resulting in irrational price performance and persistent mispricing that could not be fully accounted for by the efficient framework. Thus, the behavioral finance literature addressed the questions of why reality differs so much from the idealized world that underlies the efficient market and the Capital Asset Pricing Model and whether it could enable us to outperform the market. So far, behavioral finance models do not seem to have developed specific strategies to beat the market. Nevertheless, the field has promising directions of further
research and analysis that may be very useful in public policy and welfare analysis, as well in wealth management. For example, it be may be worthwhile to develop new investment products geared towards behavioral investors and practically applying the behavioral portfolio theory in wealth management. Also, regulators might consider carrying out a cost-benefit analysis of the welfare gains and losses entailed in taxing and borrowing in order to assess the welfare impact of margin trading and capital gain taxation.

ACKNOWLEDGEMENTS: This research paper is made possible through the help and support of many people. I would like to gratefully thank Prof. Mohamed Elhennawi, for his assistance, support and valuable advices throughout the time I spent in writing this paper.
I would also like to thank my family for their care and continuous encouragement which made the product of this research paper possible.

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