Making Sense of Behavioral Finance

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This paper demonstrates that in order to fully appreciate the nuances of financial theory, it is imperative to examine the contributions that behavioral finance has made in applying psychological paradigms to pure mathematical modeling. The current study provides an overview of the major topics and theories related to behavioral finance, including prospect theory, investor biases and inefficient markets in order to assist in managerial decision-making. The integration of behavioral elements to portfolio construction, asset pricing and wealth management are also addressed. As many of the theories of behavioral finance are of a nascent nature, the study concludes with areas for future research.

INTRODUCTION

As a point of departure, an overview of behavioral finance topics is presented in order to demonstrate that finance and financial theories are more than equations, statistics and graphs. The human psyche and condition need to be taken into account to fully reflect financial paradigms, behavior and decision-making. While traditional theories of finance consider idealized financial behavior using carefully constructed mathematical/statistical models and economic assumptions, behavioral finance theories examine observed financial behavior and involve the application of psychology to finance (Pompian, 2006; Shefrin, 2002). Within the realm of behavioral finance there are several sub-topics including individual investor behavior and biases, limits to arbitrage and inefficient markets. Behavioral finance is still a relatively nascent field developed over the past 40 years and, unlike traditional finance, there still remains a fragmented selection of research with no one integrated model.

Pompian (2006) dichotomizes behavioral finance into micro and macro topics. Micro includes the behavioral biases of individual investors that distinguish them from rational investors. Macro, on the other hand, aims to describe the anomalies in the efficient market hypothesis (EMH) that the behavioral models might explain. Shleifer and Summers (1990) present two distinct pillars that behavioral finance is said to rest on, limits to arbitrage and investor psychology. Shefrin explores behavioral finance using three distinct themes: 1. heuristic "rules of thumb" driven bias, 2. frame dependence, and 3. inefficient

markets. This is in line with Shleifer (2000) who considered the topic as either focused on the individual investor or inefficient markets.

The purpose of this paper is to provide an overview of the major topics and theories related to behavioral finance including, prospect theory, investor biases and inefficient markets in order to assist in managerial decision-making. The integration of behavioral elements to portfolio construction, asset pricing, corporate finance and wealth management are also considered. Finally, areas for future research in the area of behavioral finance will be presented.

PROSPECT THEORY, REPRESENTATIVENESS AND THE DISPOSITION EFEECT

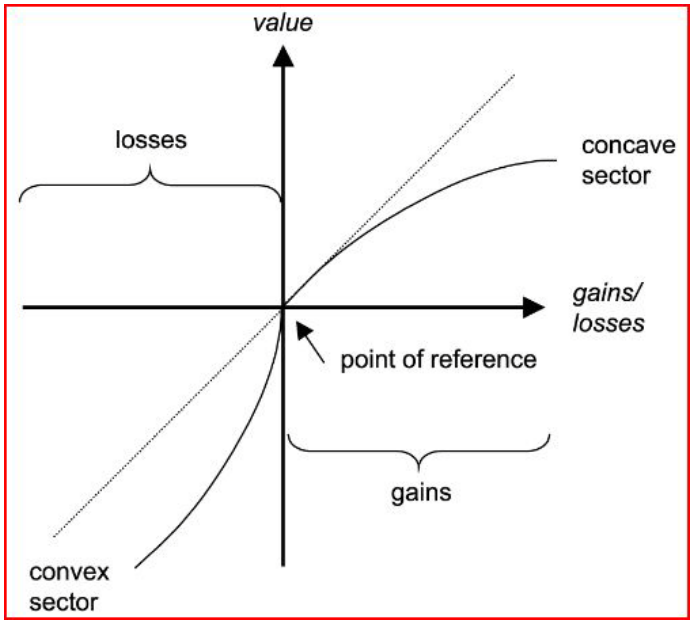
Prospect Theory

"Prospect Theory: An Analysis of Decision under Risk" was completed by Daniel Kahneman (2002 Nobel Laureate in Economics) and Amos Tversky in 1979. The article is considered the seminal work in behavioral finance (Pompian, 2006). Kahneman and Tversky developed prospect theory as an alternative to expected utility theory, recognizing that individuals act inconsistently with traditional finance theory and do not always aim to maximize their expected utility. Kahneman and Tversky observed that individuals exhibit both risk-seeking behavior and risk-averse behavior at different periods of time. Prospect theory incorporates a value function and a weighting function, and acknowledges the existence of a reference point.

Value Function

The value function of prospect theory is defined by gains and losses in relation to a reference point. This differs from previous theories in that it considers the change in wealth as opposed to considering total wealth (Kahneman and Tversky, 1979). Investors suffer from loss aversion, acting risk averse in the domain of gains and risk seeking the domain of losses. This relationship can be seen in the S shaped value function, with the marginal value of both gains and losses decreasing with scale; resulting in a concave shape above the reference point and convex shape below (Kahneman and Tversky, 1979). The average investor will therefore receive less pleasure from a gain in an investment than the pain felt from a similar loss.

FIGURE 1



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Weighting Function

The second component of prospect theory is the weighting component, whereby each outcome is given a decision weight. The decision weights may not be rational and are often not consistent. Kahmeman and Tversky (1979) found that with the weighting function there was tendency for individuals to overweight low probability outcomes and underweight high probability outcomes. Overweighting low probability outcomes implies that greater emphasis is given the events that are less likely to occur.

Mental Accounting, Framing & Reference Point

According to Kahenman and Tversky (1979), how a decision is framed will impact the outcome chosen. Framing refers to the way in which facts are presented and individual decision making is subject to the impacts of framing as well as mental accounting. Mental accounting is the tendency for individuals to treat portions of wealth separately based on a variety of subjective criteria. This criterion is not limited to separate physical accounts and could represent funds classified for different purposes by the individual. Mental accounting involves coding, categorizing and evaluating financial decisions. It can result in investors acting irrationally by considering returns in different accounts as opposed to looking at overall portfolio performance. Within prospect theory, gains and losses are determined in relation to a given reference point.

Shefrin and Statman (1985) found that investors use separate mental accounts to frame their stock positions. Assessment of performance is done for each account, with the reference point for each account most commonly being the initial purchase price. Mental accounting is further related to house money effect, whereby risk taking behavior increases as wealth grows, as they are playing with house money. When money has been won as a result of a gamble, it is likely earmarked in a mental account for future gambling.

Prior to the emergence of prospect theory, Kahneman and Tversky (1979) presented the concepts of representativeness and anchoring (Barberis and Thaler, 2005). Kahneman and Tversky were not alone, as there were other scholars had also started applying psychological theory to the realm of finance and the individual investor, such as conservatism, which explains why investors might be slow at updating models despite new evidence. Invertors, who fall victim to conservatism, will delay updating information and buy securities after they rise and sell securities after the prices have already fallen.

Representativeness

Representativeness occurs when individuals see patterns in truly random sequences and make decisions based on the similarity of past event to their current situation. Investors suffer from base rate neglect and rely on stereotype. For example, an individual may evaluate the likeliness of event A occurring based on the degree to which A reflects the essential characteristics of B (Baker and Nofsinger, 2010). When individuals fall victim to representativeness, they will violate Bayes rule of probabilities. Shefrin and Statman (2005) found that individuals who rely on representativeness may also expect that returns on a safer stock will be higher than returns on riskier stocks (as cited in Shefrin, 2005). Shefrin (2005) also considered studies completed by Grether and De Bondt and concluded that representativeness can result in predictions of reversal or continuation depending upon the context. Old dictums in finance often state, “What goes up must come down” or “The trend is your friend.”

Anchoring

Anchoring involves starting with a particular value or reference point and adjusting away from it over time. The initial amount is often chosen arbitrarily and individuals tend not to properly adjust for new information, remaining closer to the fixed amount than is warranted (Baker and Nofsinger, 2010).

Disposition Effect

The disposition effect is one of the implications of prospect theory. Shefrin and Statman (1985) postulated that the disposition effect is the tendency for investors to be anxious to sell winners and reluctant to sell losers. Many studies have since been conducted that support this effect including Odean

(1998a), and several others enumerated in Shefrin (2005) Investors have an irrational belief in reversion to the mean and, as a result, sell stocks that have gone up in value and keep stocks that have declined in value.

Heuristics, Biases and the Individual Investor

Since Kahneman and Tversky introduced prospect theory in 1979, significant research has been completed in the area of micro behavioral finance. Much of this research has taken the form of uncovering additional heuristics (rules of thumb) and biases beyond those established by prospect theory (framing, anchoring, mental accounting). The following is a selection of the most common biases that have been identified to date, as summarized by Shefrin (2005) and Pompian (2006). They are presented as either cognitive biases, which relate to faulty reasoning in the decision making process, or emotional biases, which reflect individual feelings and tend to be more impulsive reactions.

Cognitive Biases

Overconfidence. This bias be seen as "unwarranted faith in one`s reasoning, judgments, and cognitive abilities" (Pompian, 2006, p. 51) Overconfident investors are likely to hold undiversified portfolios, underestimate risks, trade excessively, and overestimate their abilities.

Cognitive dissonance. This state of imbalance occurs when incongruent beliefs exist causing mental discomfort. Individuals suffering from cognitive dissonance will in turn use selective perception and selective decision-making. These investors may also hold on to losing securities for too long or continue to invest in a bad investment.

Availability bias. This occurs when individuals estimate the probability of an event based on their own experiences and familiarity with similar previous events. Ideas that are easily retrievable and resonate stronger with the individual will often bear greater weight in their decision making. This bias may result in individuals overestimating the likelihood of some events.

Self-Attribution bias. The bias is the tendency for individuals to accept responsibility for positive outcomes and attribute negative outcomes to situational factors or bad luck. This bias can result in investors believing that short term successes are due to their superior ability, result in overconfidence and may result in excessive trading. Individuals who ignore their mistakes will also not learn from these mistakes.

Illusion of control. This is the tendency of individuals to believe that they can influence an outcome. Individuals who perceive themselves as being able to control the outcome will likely trade more often and maintain undiversified portfolios. This bias also contributes to overconfidence.

Conservatism. This bias is a mental process where previous information is held with higher regard (base rates over weighted). The bias causes individuals to overweight existing information and fail to properly adjust for new information or do so very slowly. Individuals subject to conservatism bias will find difficulty in processing complex information.

Ambiguity aversion. People dislike uncertainty more than they dislike risk and would rather bear known risks as opposed to unknown risks. An aversion to ambiguity may result in an investor choosing to avoid investments or markets where the risks are unknown. A higher tendency to invest in the stock of an employer or the domestic market will likely result from this bias. Investors may also require additional compensation for bearing risk that is uncertain.

Confirmation bias. This bias occurs by an individual choosing to accept and collect information that supports their existing beliefs or choices and ignoring or discounting information that is contradictory. This can cause individuals to overweight in company stock and can result in undiversified portfolios.

Hindsight bias. Individuals tend to overestimate the accuracy of their predictions. This bias occurs when a person falsely believes that he or she predicted the outcome of an event. This bias can give investors a false sense of security, as it sees them recalling their ability to predict an event and failing to recall their errors in judgment.

Recency bias. This is a predisposition wherein an individual recalls more recent events and places greater weight upon them. This reliance on short term memory sees the individual neglecting events that

are not fresh on the mind. This can cause investors to ignore asset allocation, focus on recent stock performance, and use samples to make projections that are too small.

Emotional Biases

Endowment bias. Individuals place greater value on an object, when they own it than they would pay for it, if they did not own it. The difference in weight placed on the same item is known as the endowment bias.

Self-control bias. The tendency is for individuals to lack self discipline, foregoing long-term goals for short-term benefits. This is most evident in the balance between savings and consumption. Behavioral life cycle theory assumes wealth is divided in to three mental accounts, current income, current assets and future income (Thaler, 1999). People are more likely to build savings with the money they view as wealth as opposed to current income.

Optimism bias**.** The tendency is for an individual to adopt an inside view in lieu of an outside view that is more reflective of the circumstances, which can result in an individual believing they have unique insight. This can be observed by the purchase of company stock in an individual's retirement account.

Loss aversion bias. Individuals do not enjoy losses and will try to avoid them as much as possible. This bias can be seen in individuals that are more likely to hold on to losers and more likely to sell winners. This bias is closely related to the disposition effect and results in investors holding losing investments too long and selling winners too early.

Regret aversion bias**.** This bias involves an individual's fear of regret, particularly regret from committing errors of omission or errors of commission. Errors of omission include missed opportunities resulting from inaction. Errors of commission result from misguided actions, such as, choosing a poor performing investment. This bias can cause investors to remain invested in shares for too long, concerned about either missing out on additional profit potential or crystalizing a loss. It could also impact the investment choices of the individual, or keep the individual out of the market altogether.

Status quo bias**.** The preference is to keep things as they are without any adjustment, which is a passive investment strategy known as buy and hold. This bias can cause investors to remain invested in inappropriate holdings despite excessive risks or poor fit with objectives or performance. The status quo bias can be combined with loss aversion bias to explain why investors may continue to hold securities to avoid realizing a loss.

These biases help to explain why individuals make the financial decisions that they do. Awareness of these biases is the first step to understanding investor behavior and the implications for the functioning of capital markets. Pompian (2006) found that cognitive and emotional biases can either be accommodated for or corrected depending upon the characteristics of the individual investor. Emotional biases are typically more difficult to correct, as they are rooted in individual feelings.

Individual Investor

The individual investor is often subject to multiple heuristics and biases at any given time. Empirical research has examined how investors behave, with several trends emerging. When investors are making a decision to invest they can theoretically consider all securities in the market. French and Poterba (1991) found, however, that investors in the US, Japan and the UK allocated 94%, 98% and 82%, respectively, of their overall equity holdings to domestic stocks (as cited in Thaler, 1999). These allocations are significantly higher than the size of the respective domestic markets related to the size of the global market. This tendency for investors to overweight their portfolio holdings in the domestic market has become known as home bias.

Barberis, Shleifer and Vishny (2005) suggest that investors are slow to react to good news, underreacting in the short term, and overreacting in the long term. Odean (1998b) examined data from a large discount broker and found that investors trade excessively and are overconfident in their ability to pick winners and are reluctant to sell losers. During the buying decision, investors do not consider the entire investment universe, but instead are driven by attention, specifically looking at securities that draw their attention in either a good or bad way (Odean, 1999). In the selling decision, the majority of investors

tend to only consider selling their existing holdings, ignoring the possibility of short sales (Odean, 1999). Gender also plays a role in the behavior of individual investors, with males showing a higher level of overconfidence, resulting in a greater number of transactions and worse portfolio performance (Barber and Odean, 2001). Overconfident investors will set confidence intervals too narrow and poorly estimate their probabilities. This overconfidence may be the result of self-attribution bias and hindsight bias. Hindsight bias is the tendency of an individual to look back at an event and feel as though they predicted the event before it happened (Shleifer, 2000).

Once a person forms an opinion, he or she holds on to it for some time, and are reluctant to consider information that may conflict with the original belief (Pompian, 2006). This is known as belief perseverance and is closely related to confirmation bias, which is when people misinterpret evidence, using the evidence to support their argument, when it in fact goes against their hypothesis. This could result in overconfidence in decision-making, whereby investors maintaining the status quo by holding inappropriate assets for too long.

BEHAVIORAL PORFOLIO THEORY

Questions readily arise surrounding the composition of portfolios under the paradigm of prospect theory. Unlike optimal portfolios in modern portfolio theory, Barber and Odean (2000) found that individual portfolios are not well diversified and that individuals combine very risky assets with very safe assets. Behavior Portfolio Theory (BPT), as described by Shefrin (2005), also finds that individuals are slow to realize a loss, which is supportive of the disposition effect. In BPT, investors are subject to mental accounting and construct their portfolios as layered pyramids in which the bottom layers are designed for downside protection and the top layers are designed for upside potential. Risk aversion gives way to risk seeking at the uppermost layer as the desire to avoid poverty gives way to the desire for riches (Shefrin and Statman, 2000). The aspirations of the individual investors see some filling the uppermost layer with the few stocks of an undiversified portfolio; others fill it with lottery tickets. Neither lottery buying nor undiversified portfolios are consistent with mean–variance portfolio theory, but both are consistent with BPT (Shefrin and Statman, 2000)

The weighting function of prospect theory induces individuals to be risk seeking in the domain of losses and risk averse in the domain of gains (Kahneman and Tversky, 1979). Individual portfolios are also sensitive to their individual reference points. Portfolios with low reference points see investors choosing traditional portfolios; however, those with high reference points see investors behaving as risk seekers (Shefrin, 2005). Barber and Odean (2000) found that excessive trading is a cause for higher transaction costs and subsequently lower overall returns. Excessive trading is often the result of overconfidence.

Benartzi and Thaler (2005) found that when investors diversify, they often fail to optimize their holdings, and naïvely invest 1/n of their savings to each of the potential investment opportunities. Naïve diversification can lead to inappropriate asset allocation depending upon the investment options and is of particular concern for defined contribution pension plan assets. If the plan sponsor offers a greater number of equity funds in relation to total fund offerings, the majority of investors may have a higher allocation to that which is desired or appropriate (Benartzi and Thaler, 2005).

IMPLICATIONS FOR FINANCIALS PROFESSIONALS

In an efficient market with rational investors the price of a security should be reflective of its fundamental value (present value of future cash flows). The economic law of one price stipulates that the same asset cannot trade simultaneously at different prices. This law is central to traditional finance theory and implies that when markets are efficient, any short term mispricing is said to be eliminated almost immediately through arbitrage. Behavioral finance recognizes, however, that there are limits to arbitrage in the investment world. These limits include risk, costs and timing. These limits to arbitrage can result in substantial mispricing that persists over time and can even deepen before correcting (Shleifer, 2000).

Mispricing can also be slow moving with arbitrageurs requiring long time horizons in order to benefit from them (Shleifer and Vishny 2005). The deviations from the fundamental values occur for a variety of reasons, including the existence of irrational players. The irrational trader is said to exist due to a number of reasons including overconfidence, optimism, representativeness, conservatism, and belief perseverance. These irrational traders are considered 'noise traders' and the rational traders are considered 'arbitrageurs.' Noise traders fall victim to behavioral biases and form portfolios under erroneous beliefs (Shleifer, 2000). Arbitrageurs aim to exploit the misperceptions of these noise traders but are subject to noise trader risk (Shleifer and Vishny, 2005; Shleifer, 2000). Noise trader risk is the possibility that a change in the opinion of noise traders will result in price movement further away from the fundamental value, deepening the mispricing over the short term and increasing the risk borne by the arbitrageur until a correction occurs (Shleifer, 2000). This uncertainty can significantly reduce the attractiveness of pursing an arbitrage strategy.

Shiller (2000) argues that markets go through periods of 'irrational exuberance,' due to structural, cultural and psychological factors. Irrational exuberance is an environment of inflated stock prices that form a speculative bubble and occur largely as a result of investor sentiment and enthusiasm rather than fundamental values. He demonstrates that over the twentieth century stock prices increased dramatically, but with no support from real earnings. A sampling of the structural and cultural factors Shiller presents to support his theory include the arrival of the internet, impact of baby boomer generation, growth in news media and its role in covering the market, expansion in retirement savings plans and mutual fund offerings. The psychological factors, arguably more relevant to the field of behavioral finance, include herd mentality, anchoring, the tendency to invest in the company stock, overconfidence and representativeness. Investors' confidence has been supported by previous market performance, which in turn entices investors to bid up prices even further beyond their underlying intrinsic value. This behavior acts as an amplification mechanism in the creation of a speculative bubble.

The house money effect also has an impact on an investor's decision-making when in a gain position, as the inclination is to reinvest 'winnings' under the presumption of having nothing to lose. Shiller (2000) argues that there is indifferent thinking by many and only careful research done by few, resulting in significant influence from news media. The impact of the combination of existing structural factors and potential new factors on the growth in the market is yet to be seen. Investors that have placed their full faith in the stock market to provide for retirement may be at risk if and when markets return in line with fundamental values. Shiller concludes by providing a call to action, encouraging investors to diversify thoroughly, reduce their exposure to the US stock market, and increase savings rates. He also provides suggestions to institutional investors, such as endowments and foundations to cut spending rates, and general market recommendation to increase free trade and create freer markets. Although the existence of speculative bubbles appears likely in the future, Shiller (2000) encourages the creation of strong institutions to effectively manage the risks.

CONCLUSIONS AND SUGGESTIONS FOR FUTURE RESEARCH

In order for financial theory to reflect the dynamics of the investment world, human behavior should be considered. Behavioral finance focuses on this human element and aims to fill the gaps where traditional finance theory has fallen short. Thaler suggested the end of behavioral finance in 1999, citing that the concepts were gaining wide acceptance among finance academics and practitioners and were no longer controversial. Although behavioral finance continues to be a growing field, many unknowns still remain. Barberis and Thaler (2005) acknowledge that existing models typically offer insight in to an investor's beliefs, preference or limits to arbitrage, but not all three.

Potential areas for further research related to behavioral finance are substantial and include corporate finance, behavioral portfolio theory, implications for wealth management, and the individual investor. While some research currently exists for how rational managers can act in irrational environments (Stein, 2005), there still remains room for additional research on how the behavioral biases of the manager might impact firm performance.

The implications of heuristics and biases on the construction of individual portfolios are important topics given the implications for the individual investor. As a greater number of individuals will be relying on their individual savings for retirement, it is important to consider how behavioral biases may impact portfolio construction and performance. In particular, how does satisficing as opposed to optimizing impact portfolio performance over longer time periods? As more investor information and data become available the opportunity for a longitudinal study may arise. The implications of this research will be useful to individual investors, investment professionals that advise clients, plan sponsors that decide on fund offerings for retirement plans, and governments that create policy.

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