FINANCIAL SERVICES REVIEW

Financial Services Review 11 (2002) 97–116

Psychological Biases of Investors

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Accepted 15 April, 2002

Abstract

We review the field of behavioral finance as it relates to investors. Specifically, we examine common investment mistakes caused by an investor's cognitive and emotional weaknesses and group these mistakes into two categories: how investors think and how investors feel. Although most recent research deals with these psychological influences in investor decision-making, we also discuss social factors that affect financial decisions. We suggest five steps that investors can take to help overcome common investor mistakes. Finally, we present some thoughts on further behavioral research involving investors. © 2002 Academy of Financial Services. All rights reserved.

JEL Classification: D10; G10

Keywords: Behavioral finance; Investor psychology

1. Introduction

Although cognitive and emotional weaknesses affect all people, traditional or standard finance ignores these biases because it assumes that people always behave rationally (Statman, 1995). One of the central propositions of financial theory for the past three decades is that markets are efficient. Efficiency means that the price of each security coincides with fundamental value, even if some investors commit errors due to biases or frame dependence (e.g., how they view a decision problem). Although a case can be made against efficient

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markets, existing evidence does not generally support the ability of investors to consistently produce excess returns. That is, although market inefficiencies may exist, they are generally not easy to exploit. If stock prices are efficient and transaction costs and taxes are ignored, investors should not do serious harm to their wealth if they trade frequently or follow specific investing strategies. Therefore, traditional finance has developed in a normative manner. That is, traditional finance concerns the rational solution to the decision problem by developing ideas and financial tools for how investors *should* behave. As a consequence, traditional finance typically does not focus on actual investor behavior and its consequences.

Alternatively, behavioral finance examines how real people *actually* behave in a financial setting and is, therefore, descriptive. Behavioral finance is what Thaler (1993) calls "open-minded finance" because it entertains the possibility that some agents in the economy behave less than fully rationally some of the time. At the most general level, behavioral finance is the application of psychology to financial behavior. Proponents of behavioral finance contend that people may not always be "rational," but they are always "human." Thus, behavioral finance exposes the irrationality of investors in general and shows human fallibility in competitive markets. Not surprisingly, skeptics such as Fama (1998) and many others claim to be not persuaded by the mounting evidence about behavioral finance. For example, they point out that long-term anomalies, which challenge the efficient market hypothesis, are sensitive to methodology.

Although departures from rationality are sometimes random, they are often systematic. As Shleifer (2000, p. 10) notes, "Investors' deviations from the maxims of economic rationality turn out to be highly pervasive and systematic." For example, psychologists have known for a long time that people often act in a seemingly irrational manner and make predicable errors when forecasting. Behavioral finance relaxes the usual assumptions of traditional finance by incorporating observable, systematic, and very human departures from rationality into models of financial markets and behavior. By combining psychology and finance, researchers hope to better explain certain features of securities markets and investor behavior that appear irrational.

Why does it matter if investors behave differently than traditional finance says they should? Shefrin (2000) notes that investors are prone to committing specific errors of which some are minor and others are fatal. By allowing psychological bias and emotion to affect their investment decisions, investors can do serious harm to their wealth. As Kahneman and Riepe (1998, p. 53) note, "Investors who are prone to these biases will take risks that they do not acknowledge, experience outcomes that they did not anticipate, will be prone to unjustified trading, and may end up blaming themselves or others when outcomes are bad." Understanding the psychological basis for investor errors and taking appropriate actions to correct such errors may reduce their effects on investment decisions and potentially lead to improved investment results. This does not necessarily mean, however, that taking such actions will lead to excess returns. Ample evidence exists that indexing generally beats active investing.

Shefrin (2000) organizes the psychological phenomena pervading the landscape of finance around three themes: (1) heuristic-driven bias; (2) frame dependence; and (3) inefficient markets. In this article, we focus on the first theme but leave the discussion of frame dependence (Shefrin, 2000) and inefficient markets (e.g., Haugen, 1999a, 1999b; Shleifer,

2000; Shefrin, 2000) to others. Specifically, we examine the psychological biases of investors whether individuals are acting on their own account or are in charge of institutional money.

The foundation for some of these biases comes from prospect theory, developed by Kahneman and Tversky (1979). Prospect theory provides a descriptive framework for the way people make choices in the face of risk and uncertainty. Decision-making involves two processes: *editing* and *evaluation.* The editing phase organizes, simplifies, and reformulates the prospects. The evaluation phase places a value on each prospect in order to identify the one with the highest value. However, the value function used has some asymmetries. The value of a $1 changes depending on whether it is a gain, loss, or follows other gains or losses. Many of the psychological biases described here can be derived from the dynamics of the editing and evaluation phases of prospect theory. For example, mental accounting, the status quo bias, reference points, and the disposition effect can be derived from prospect theory. However, other biases, like overconfidence, cognitive dissonance, and optimism bias are not directly derived from prospect theory. Indeed, critics have pointed to the lack of one all-encompassing theory for explaining psychological biases and social influences as a problem with behavioral finance (Fama, 1998). Nevertheless, we use a two-level typology—internal (thinking and feeling) and societal (friends, relatives, media, and colleagues)– to organize investor psychological biases. Others, including Kahneman and Piepe (1998) and Hirshleifer (2001), also classify deviations from the standard decision-making models into several broad categories. We discuss various psychological biases and evidence involving these biases but do not claim to provide an exhaustive synthesis of the literature. Indeed, the literature is expanding rapidly. Not surprisingly, some biases are interrelated. In some instances, empirical findings in behavioral finance lack consistency; that is, the support for a particular bias may be mixed or may contradict other biases.

In Sections 2 and 3, we organize the investment problems caused by an investor's psychology into two categories: how investors think and how investors feel. Although most recent research deals with these psychological influences in investor decision-making, humans are social creatures. People do not make decisions based on just internal inputs—they communicate with others. The social influences of the media as well as friends, relatives, and colleagues also affect investment decisions. Therefore, we discuss social impacts on the investor in Section 4. In Section 5 we discuss steps that investors can take to reduce common investor mistakes. Because the finance profession has just begun to identify how psychological and social factors affect financial decisions, much research still needs to be done. We present some thoughts on further research in Section 6.

2. How investors think

In this section, we focus on various rules of thumb or heuristics that can lead to psychological biases and systematic errors involving how investors think. To decrease the amount and complexity of information requiring analysis, the brain filters out some information and uses shortcuts to decrease the complexity of other information. These shortcuts allow the brain to generate estimates before fully digesting all the available information. This

process, called *heuristic simplification,* causes several psychological biases for the investor. For example, people generally think they are better decision makers than they really are. In addition, they seek information that confirms this belief. This ongoing self-deception leads to decision errors. Individuals become too confident that their opinions are correct and thus place too much value on their previous decisions.

2.1. Representativeness bias

The brain makes the assumption that things sharing similar qualities are alike. *Representativeness* is judgment based on stereotypes. The representativeness bias causes investors to buy stocks that represent desirable qualities (Shefrin, 2000). For example, investors confuse a good company with a good investment. Firms that generate strong earnings, have high sales growth, and quality management represent good companies. Good investments are stocks that increase in price more than other stocks (Solt & Statman, 1989).

Classifying good stocks as firms with a history of consistent earnings growth ignores the fact that few companies can sustain the high levels of growth achieved in the past. The popularity of these firms drives prices higher until the stock becomes overpriced. Over time investors become aware that they have been too optimistic in predicting future growth and the stock price falls.

Lakonishok, Shleifer & Vishny (1994), henceforth LSV, study the performance of stocks that investors typically consider to be growth or "glamour" stocks. LSV label the stock of firms that investors typically consider being bad firms with minimal growth prospects as "value" stocks. The 10% of firms with the highest average growth rates are glamour firms, whereas the firms with the lowest sales growth are value firms. Using data for all stocks on the New York Stock Exchange and American Stock Exchange over the period 1963 to 1990, LSV report that the glamour stocks earned an 11.4% return during the purchase year. This compares to a return of 18.7% for the value stocks. The average total return over a five-year period was 81.8% for the glamour stocks and 143.4% for the value stocks. Good companies do not always make good investments.

Investors also make this error when examining past stock returns. For example, stocks with poor (strong) performance during the past three to five years may be considered losers (winners). Investors consider this past return to be representative of what they can expect in the future. This causes investors to chase the winners and buy firms or mutual funds that have trended upwards in price. De Bondt and Thaler (1985) show, however, that the losers tend to outperform the winners over the next three years by 30%.

This investor behavior also occurs during the short-term. Many investors buy stocks that have recently increased in price. Dhar and Kumar (2001) investigate the price trends of stocks bought by more than 62,000 households at a discount brokerage firm during a five-year period. On average, these stocks increased by 0.6% during the week before the purchase. The increase was 1.2%, 2.2%, and 7.3% for the two weeks, one month, and three months before the purchase, respectively. Investors like to buy past winners because they believe that the past price trend is representative of the future price trend. Thus, such investors tend to be overly optimistic about past winners and overly pessimistic about past losers.

2.2. Cognitive dissonance

One reason that learning from past mistakes is difficult is because the brain filters memories. To avoid having to deal with two conflicting things, the brain filters the information it receives and its relation to a person's memories. *Cognitive dissonance* is the inconsistent mental state that precedes the adjustment process. That is, people tend to ignore, reject, or minimize any information that conflicts with a particular belief. They adjust the memory about the information and even change the recollection of the previous decision (Akerlof & Dickens, 1982). Cognitive dissonance results in investors attempting to avoid or discount a conflicting belief and seeking out support for the preferred belief.

An investor's brain will reduce psychological pain by adjusting the beliefs about the success of past investment choices. That is, investors may remember their past performance as better than it actually was. Goetzmann and Peles (1997) measure the recollections of investors. They ask investors two questions about the return on their mutual fund investments during the previous year: (1) What was the return last year? (2) By how much did you beat the market? If investors are not biased by cognitive problems, the average recollection of performance should be equal to the actual performance.

Goetzmann and Peles ask these questions to two groups of investors. The first group, consisting of architects, recalled an investment performance that was 6.22% higher than its actual return. Also, their estimate of how much they beat the market was too optimistic by 4.62%. The second group of investors, consisting of members of a state chapter of the American Association of Individual Investors, overestimated its past return by 3.40%, on average. They overestimated their performance relative to the market by 5.11%. People want to believe that their investment decisions are good. In the face of evidence to the contrary, the brain's defense mechanisms filter contradictory information and alter the recollection of the decision.

2.3. Familiarity bias

People often prefer things that have some *familiarity* to them. Consequently, investors tend to put too much faith in familiar stocks. Because those stocks are familiar, investors tend to believe that they are less risky than other companies or even safer than a diversified portfolio.

Tens of thousands of potential stock and bond investments exist in the United States and many more choices exist abroad. From these many choices, investors trade in the familiar securities. For example, investors tend to buy the stocks of companies that have a local or regional business presence (Huberman, 2001). Investors also buy a disproportionate amount of securities from their country, despite the well-documented gains from international diversification. This is called the *home bias* (French & Poterba, 1991). Investors have a home bias because companies from their country or region are more familiar to them than foreign companies. Coval and Moskowitz (1999) also show that the preference for investing close to home also applies to portfolios of domestic stocks. Specifically, U.S. investment managers have a strong preference for locally headquartered firms.

Many people are most familiar with the company for which they work. In a study of

401(k) plans at 154 firms in the S&P 500 Index, Benartzi (2001) studied the allocation choices of 2.57 million participants. In total, $33 billion of the total $102 billion in assets in these plans or about 32% was invested in the companies' stock. Some of these companies match their employees' contributions by giving company stock. In those plans where the employee can decide the fate of the matching contribution (as well as their own), company stock still represents 25% of the assets.

Employees often compound the familiarity error by succumbing to the representativeness bias. That is, they buy more of their company's stock after its price increases. Employees who work for a company whose stock price increase was among the top 20% of all firms in the past five years allocated 31% of their contributions to the company stock. This compares to an allocation of only 13% to company stock in firms whose performance was in the worst 20%. The actual 401(k) asset allocation behavior of employees suggests that they use the past price trend as a determinant for investing in the company stock.

2.4. Mood and optimism

Mood affects the way investors analyze and make judgments (Nofsinger, 2002b). People in a good mood make more optimistic judgments than people in a bad mood. Being in a bad mood makes investors more critical. This, in turn, helps them to engage in more detailed analytical activity. Alternatively, people in good moods tend to use less critical modes of information processing. This mood-effect particularly affects relatively abstract judgments where people lack full or accurate information. Of course, this situation describes the investment environment. Bad moods call for more critical analysis in stock market judgments, whereas good moods cause decisions without the detailed analysis. Therefore, making investment decisions while in a bad mood may not have a detrimental effect on an investor's portfolio. However, if a good mood causes an investor to buy a stock without conducting a proper analysis, the investor may regret this decision in the future.

The effect of mood on decisions can be quite dramatic, but does it affect investor decisions? Psychologists can run experiments that influence moods and determine the correlation between mood and behavior. Direct links between mood/optimism and investor behavior may be more difficult to test for financial economists. One external factor that influences mood and the level of optimism that can be examined is sunshine. For the past several decades, psychologists have documented how the sun affects people's decisions. Researchers link a lack of sunlight to depression and even suicide, whereas an abundance of sunlight contributes to good moods and optimism.

Sunshine affects mood and optimism, which, in turn, influences financial decisions. For example, people tip a waitress or waiter 50% more on sunny days than on rainy days (Rind, 1996). Can the happy mood of a sunny day affect investors and the stock market? If the sunshine puts investors in a good mood, they will be more optimistic about future prospects. Therefore, investors are more likely to buy stock, rather than sell stock, on sunny days. If the tendency to buy rather than sell affects enough investors, this could also have an effect on the stock market.

Hirshleifer and Shumway (2001) examine this possibility by looking at stock market returns and the weather in various financial cities. Specifically, they compare the daily return

in 26 stock exchanges around the world to the weather in the 26 cities where the stock markets are located. They use a weather scale with nine levels between completely sunny and completely miserable. The daily returns for sunny days are significantly higher than the daily returns for nonsunny days.

Another way to examine the effect of sunshine on investor mood and behavior is to examine stock market returns by seasons. Psychologists have found that the decreasing amount of daylight during the fall and winter leads to depression for many people, called Seasonal Affective Disorder (SAD). If the decreasing length of daylight affects many investors, then they would take less risk. Kamstra, Kramer & Levi (2001) study seven stock markets: Australia, Britain, Canada, Germany, New Zealand, Sweden, and the United States. They find that stock returns are lower during the fall when daylight decreases until December 21, the longest night of the year. This effect is stronger for those stock markets that are farthest away from the equator (Sweden and Britain). Also consistent with this idea is that the effect occurs during the spring for markets in the southern hemisphere (Australia and New Zealand). Again, daylight (or the lack of it) apparently influences investor mood. This mood also affects investment decisions.

Nofsinger (2002b) claims that investors can suffer from optimism bias, which is one of the precursors to overconfidence. That is, investors can believe that nothing bad is likely to happen to their stock picks. Optimism affects investors in two ways. First, optimistic investors tend to do less critical analysis in making their stock decisions. Second, optimists tend to ignore (or downplay) negative information about their stocks, similar to cognitive dissonance. In other words, the optimistic investor holds fast to the belief that a firm is great, even when negative news comes out about the firm—just as the smoker downplays the risk of getting cancer after reading the warning label.

2.5. *Overconfidence*

Closely related to mood and optimism is overconfidence. Investors are usually overconfident about their abilities to complete difficult tasks successfully, such as picking winning stocks. They believe their knowledge is more accurate than it really is and that their forecasts are more precise than their experience should validate. Belsky and Gilovich (1999) refer to overconfidence as "the ego trap" and note that overconfidence is pervasive.

Several factors contribute to overconfidence. One of these factors, called the *illusion of knowledge,* is having more information available. Increased levels of information do not necessarily lead to greater knowledge because many investors may not have the training, experience, or skills to interpret this information. Also, investors tend to interpret new information as confirmation of their prior beliefs.

Another important psychological factor is the *illusion of control.* People often believe that they have influence over the outcome of uncontrollable events. Presson and Benassi (1996) show that the key attributes fostering the illusion of control are choice, outcome sequence, task familiarity, information, and active involvement. According to Barber and Odean (2002), online investors routinely experience these attributes. They actively make their choices, experience positive and negative outcomes, become more familiar with the trading process, and have access to vast amounts of information.

A Gallup/Paine Webber survey of individual investors conducted in early 2001 demonstrates this overconfidence. Of particular note is that many of those surveyed had recently experienced some negative outcomes after the technology stock bubble collapsed. When asked what they thought the stock market return would be during the next 12 months, the average answer was 10.3%. When asked what return they expected to earn on their portfolios, the average response was 11.7%. On average, investors expect to earn an above average return.

Barber and Odean (1999) describe how investors overestimate the precision of their information and exhibit biases in their interpretation of that information. Overconfident investors believe more strongly in their valuation of a stock, and concern themselves less about the beliefs of others.

To test the excessive trading and risk taking predictions of overconfidence, Barber and Odean (2001a) examine the trading behavior of nearly 38,000 households through a large discount brokerage firm between 1991 and 1997. They examine the level of trading in brokerage accounts owned by single and married men and women. Psychologists have found that men tend to be more overconfident than woman in tasks that are considered to be masculine (Beyer & Bowden, 1997). Barber and Odean posit that investing has traditionally been a masculine task in the United States and predict that men, therefore, will be more overconfident than woman in investing. The study shows that single men trade the most with an equivalent of 85% annual turnover. This compares with an annual turnover of 73% for married men. Married and single women only trade the equivalent of 53% and 51%, respectively, in annual turnover. This evidence is consistent with overconfidence. Men are more overconfident than women investors, leading to higher levels of trading. Also consistent with the overconfidence hypothesis, Barber and Odean report that single men have the highest risk portfolios followed by married men, married women, and single women. That is, the portfolios of single men have the highest volatility, highest beta, and include smaller sized companies.

In general, this higher trading contributes to poor returns. Barber and Odean (2000) examine the relationship between turnover and portfolio returns. First, they sort investors into five groups by their level of trading turnover. The lowest turnover group had a 2.4% turnover rate per year. The highest turnover group experienced an average annual turnover of more than 250% per year. Although all five groups earned the same 18.7% annually in gross returns, the high turnover investors earned an 11.4% net return whereas the low turnover group earned an 18.5% net return.

Commission costs are not the only problem caused by excessive trading. Research shows that overconfidence leads not only to trading too frequently but also to buying the wrong stocks. According to Odean (1999), the stocks that investors sold earned 2.6% during the following four months. In contrast, the stocks investors replaced them with earned only 0.11%. In the year following the trades, stocks that had been sold outperformed stocks purchased by 5.8%.

This overconfidence causes investors to trade too much and to take too much risk. As a consequence, investors pay too much in commissions, pay too much in taxes, and are susceptible to big losses. They also get surprised more often than they anticipate. Overconfidence increases trading because it causes investors to be too certain about their opinions;

that is, investors believe they can predict winners. Investors derive their opinions based on their beliefs about the accuracy of the information they have obtained and their ability to interpret it.

2.6. Endowment effect

People often demand much more to sell an object than they would be willing to pay to buy it (Kahneman, Knetsch & Thaler, 1990, 1991). Thaler (1980) calls this the *endowment effect.* Apparently, people do not over value the things they own so much as they are affected by the pain associated with giving them up.

How can endowment bias affect investors? People have a tendency to hold the investments they already own. For example, Samuelson and Zeckhauser (1988) told students they just inherited a large sum of money. The students had the different investment choices of a moderate-risk company, a high-risk company, treasury bills, or municipal bonds. The favored investment choice to hold was the type of investment they had inherited. That is, if the students inherited treasury bills, then they opted to hold them. If they inherited a high-risk company, they opted to hold that investment. Thus, the endowment effect had a greater influence on these subjects than did their risk and return objectives.

2.7. Status quo bias

A closely related behavior is the tendency to do nothing when faced with choices (Samuelson & Zeckhauser, 1988). When faced with taking an action in an investor's best interest, the *status quo bias* influences the investor to do nothing. People prefer to hold the investments they already have. Changing an investment may imply that the previous purchase decision was a poor one. This is particularly prevalent after stock prices have fallen. Status quo bias involves preferring the default choice, which is often the do-nothing option.

In formulating their theory of "choice under conflict," Tversky and Shafir (1992) realized that the decision to delay an action, or take no action, increases when many attractive options exists. When investors face many investment choices, the task of making a decision can be overwhelming. Consequently, some investors choose to avoid making a change. For example, this problem magnifies the asset allocation problem in 401(k) plans and helps to explain why many investors procrastinate on making contributions to such plans.

2.8. Reference points and anchoring

Some investors fixate on specific stock prices. The specific prices are called *reference points* and the fixation is called *anchoring.* Benartzi and Thaler (1995) argue that a reference point is the stock price that investors compare to the current stock price. The brain's choice of a reference point is important because it determines whether the investor feels the pleasure of obtaining a profit or the pain of experiencing a loss. One important reference point is the purchase price of the security. If an investor bought an asset long ago, the investor would tend to use a more recently determined reference point. The highest price the investor has

seen also becomes a reference point and anchor. Investors typically wait for the stock's price to reach a reference point before making a trade.

Heath, Huddart & Lang (1999) investigate reference points in the exercising of stock options. Some managerial corporate employees receive stock options as a part of their compensation. After the vesting period, an employee can exercise the options and receive the difference between the stock price at the time and the strike price of the option. Heath et al. find that the most likely reference point used is the highest stock price of the previous year. Using detailed records for 50,000 employees at seven corporations, they report that the rate of exercising options nearly doubles when the stock price moves above the 52-week high. In the investor's mind, the reference point determines whether a position is at a profit or loss. However, investors appear to periodically update the reference point to reflect unrealized profits.

2.9. Law of small numbers

People see patterns in data that are random and then make predictions about the future based on those perceived patterns. If a game is believed to be fair, like a roulette wheel, keno game, or state lottery, people cling to the idea that all the numbers in the game should come up the same number of times, on average (Nofsinger, 2002a). This concept is true for very large trials of the game, but not for small trials. In a small number of trials, the outcome can appear very unfair. The belief that some self-correcting process exists in the short-term that makes games fair is known as the *gambler's fallacy.*

Many investors do not believe that the stock market is random. As such, they tend to behave as if a stock price trend will continue. This is because investors have a mistaken belief that a small sample resembles the population (Rabin, 2002). Therefore, investors overinfer short sequences, which leads to faulty predictions about the future. As an example, consider the responses of investors who are asked whether the direction of the stock market in the next six months will be bullish, bearish, or neutral. The American Association of Individual Investors (AAII) asks this question each week to a random sample of 125 of its members. De Bondt (1993) finds that the investors' responses are very closely related to the direction of the market in the week(s) before the investors receive the survey question. That is, if the investors receive the question after a run-up in the stock market, they report a belief that the market will be bullish for the next six months. On the other hand, if the question follows a decline in the market, investors forecast a bear market in the next six months. Investors predict that the current trend will continue.

2.10. Mental accounting

Mental accounting is a process by which the brain keeps goals and moves toward those goals separately from each other (Thaler, 1980). For example, a person may keep investments for retirement in one mental account and investments for the down payment on a house in another mental account. This is a mechanism that helps with self-control. Keeping things separate allows for easy measurement of the progress of each goal. However, Barberis and

Huang (2001) show that mental accounting can contribute to, or magnify, other psychological biases, such as the disposition effect detailed in the Section 3.1.

In addition, Shefrin and Statman (2000) illustrate how mental accounting affects investors' perception of portfolio risks. To implement portfolio theory, the investor must consider three important characteristics of each potential investment—its expected return, level of risk, and its correlation with other investments. Since correlation is how each investment interacts with the others and mental accounting is the tendency to overlook the interaction between investments, investors have difficulty relating to this form of diversification. As a consequence, investors take more risk than needed to achieve their desired return.

3. How investors feel

A common adage on Wall Street is that markets are motivated by two emotions: greed and fear. Although these emotions affect investors, other strong emotions such as hope, pride, and regret also influence decisions. Emotions can hamper making good investment decisions.

3.1. Disposition effect

People want to feel good about themselves. Two strong emotions—pride and regret—play a role. People seek actions that will give them pride and avoid taking actions that will make them feel regret. Shefrin and Statman (1985) show that *avoiding regret* and *seeking pride* also have an effect on investors' decisions. Specifically, they show that fearing regret and seeking pride cause investors to be predisposed to selling winners too early and riding losers too long. They call this the *disposition effect.* When an investor sells a winner, s/he experiences the pleasant feeling of having made a good decision in the original purchase. If the stock price declines after a purchase, the investor tends to hold the stock instead of selling it. The investor wants to avoid the bad feeling of having made a poor decision by purchasing the stock. Both of these emotions affect selling decisions. These emotions consequently result in selling good-performing stocks and keeping poor-performing stocks. This self-control problem hurts returns.

Unfortunately, some evidence shows that the good-performing stocks that investors sell tend to continue to do well, whereas the losers that investor hold continue performing poorly. For example, De Bondt and Thaler (1985, 1987) find that stocks that have been extreme past losers in the preceding three years do much better than extreme past winners over the subsequent three years. The question of why winners continue to win and losers continue to lose is puzzling and does not lend itself to easy explanations. However, Shefrin (2000) attributes the winner-loser effect to heuristic-driven bias stemming from conservatism (anchoring and adjustment), overconfidence, and salience.

Odean (1998) studied the trades of 10,000 trading accounts from a nationwide discount brokerage during 1987 to 1993. At each sell trade, the amount of paper gains and losses in the investor's portfolio is computed. If the stock sale is of a winner (loser), the proportion of the total gains (losses) that the investor realized is calculated. Odean finds that when investors sell winners, the sale represents 23% of the total gains of the investor's portfolio.

Alternatively, a loser being sold represents only 15.5% of the unrealized losses in the portfolio. On average, investors are 50% more likely to sell a winner than a loser.

The disposition effect also predicts that investors sell winners too soon and hold losers too long. Selling winners too soon suggests that those stocks will continue to perform well after they are sold. Holding losers too long suggests that those stocks with price declines continue to perform poorly. When investors sell a winner stock, Odean finds that the stock beats the matching stocks during the next year by an average 2.35%. During this same year, the loser stocks that the investors kept under performed by −1.06%.

Grinblatt and Keloharju (2001) also examine the disposition effect by studying 293,034 sell trades in the Finnish stock market. The advantage of studying the Finnish stock market is that all investors are registered. Therefore, every trade is denoted by what type of investor (such as individual, foreign investor, government, and bank) made the sale. Consistent with the behavioral prediction, the research shows that individual investors are more likely to sell a stock if it experiences an increase in price than a decrease in price. They find that if a stock outperforms the market by 10%, the investor's likelihood of selling the stock *increases* by 26%. On the other hand, an underperformance of 10% *decreases* the likelihood of selling by 14%. Investors do not like to sell losers, only winners.

3.2. Attachment bias

Another psychological bias, *attachment bias,* causes investors to become emotionally attached to a security. People get emotionally attached to their parents, siblings, children, and close friends. This attachment causes them to focus on good traits and deeds and to discount or ignore bad traits or deeds. Investors frequently get attached to a stock. Although attachment bias has the potentially positive effect of discouraging trading with its concomitant tax and transaction cost effects, this bias can also have negative effects. When investors become emotionally attached to a stock, they also fail to recognize bad news about the company and consequently hold the stock too long. For example, many current employees and retirees get attached to the company for which they work or have worked. As a consequence, they continue to hold too large a proportion of their portfolios in that company's stock. The fact that some Enron employees exclusively held Enron stock in their 401(k) plans exemplifies this situation. This lack of diversification resulted in great losses to these employees as a result of Enron's bankruptcy.

3.3. Changing risk preferences

Emotions are particularly strong after large gains and losses (Thaler & Johnson, 1990). When an investor is on a winning streak, greed affects ensuing decisions. Having made some large gains, many investors may feel like they are playing with the *house's money.* Gamblers tend to treat winnings as if the money did not belong to them. Specifically, the feeling of betting with someone else's money causes them to accept too much risk. This could be seen in the stock market in 1999. Anecdotal evidence suggests that investors, who made big gains from the stocks of large, stable technology companies such as Intel and Cisco, started putting

those profits in much higher risk stocks such as very small companies and Internet initial public offerings.

Large losses cause the investor emotional pain. After an investor feels the pain of a large loss, s/he may react in either of two extreme ways. In one case, the investor experiences a heightened sense of fear of more losses. This feeling may cause the investor to avoid taking risk entirely by not owning any stocks. Kahneman and Tversky (1979) call this phenomenon "loss aversion." The other extreme reaction to a large loss is to take on more risk in an attempt to recoup the loss. Experiencing a loss may cause an investor to want to *get even.* This "double or nothing" attitude clouds judgment and induces taking risks not normally taken. Shefrin (2000) calls this phenomenon, "get evenitis." This notion is central to prospect theory, which explains the way people make choices in the face of risk and uncertainty. Under prospect theory, people's reactions to gains and losses are more important than how those gains or losses leave them in terms of their overall financial wealth.

4. Social effects on the investor

To date, most of the behavioral finance research on investor decision-making has focused on the investor's emotions and psychology. Yet, many social interactions probably affect these emotions and may also directly affect investment decisions. In short, people learn through interacting with other people. That is, they watch the behavior of others to interpret their beliefs. The model of Ellison and Fudenberg (1995) illustrates the importance of talking as a way to obtain information and detect the emotional reactions of others, which help form opinions. Indeed, this observational learning leads to the informational cascades that are the basis of some investor herding models (Banerjee, 1992; Bikhchandani, Hirshleifer & Welch, 1992).

Investor conversations are an important part of gathering information and becoming comfortable with the choices. Shiller and Pound (1989) survey 156 high-income investors. In more than half the cases, investor interest in a stock results from another person mentioning the stock. Since buying the stock, the investor had spoken to, on average, 20 other potential investors about the company.

4.1. The media

The media may have a tremendous influence on individuals. Business and investment writers keep investors interested in their work by telling a good story. Reporters also search for the good "sound bite" to quote. A sound bite cannot convey any serious investment analysis. Sound bites convey stories. Nofsinger (2002a) describes how the media often exacerbates bias toward storytelling and away from formal investment analysis.

The media does a good job of relating facts, such as changes in the Dow Jones Industrial Average or the reported earnings per share of a company. Such facts are often insufficient to convince investors to make investment decisions. Even when the media provides an expert opinion, the experts express themselves through one-line explanations and quips. Many of these experts have access to research departments and sophisticated analytical tools. Al-

though their opinions may be based on in-depth analysis, they rarely talk about the actual analysis. Instead, investors get the impression that investment analysis is storytelling.

The media also has a tendency to keep investors focused on specific stories for long periods of time. Shiller (2000) refers to this as an "attention cascade." In some cases, the attention cascade can contribute to the exuberance of a speculative bubble.

4.2. Social interaction and investing

People in a peer group tend to develop the same tastes, interests, and desire to live similar lifestyles. Peer groups develop social norms for what are the preferred beliefs of the group. Newcomers to the peer group discover these social norms through conversations and by watching the actions of others. Ellison and Fudenberg (1993) show that picking the "popular" choice when making a decision with incomplete information can lead to more efficient decisions. Beliefs about investing are also a part of these social norms. The environment of the investor influences the investment decisions. For example, if an investor's peer group talks frequently about its day-trading experiences, the investor is more likely to try day trading. If an investor's peers talk about international stocks, the investor may also tilt his portfolio internationally.

One common example of the influence of social interaction is participation in a 401(k) retirement plan. Many (even most) people do not participate. Education and wage levels are key determinants of participation in the 401(k) plan. People with higher education levels and higher wages are more likely to participate in such plans. The social norms of employees also affect the participation decision.

Duflo and Saez (2002) illustrate how dramatic the peer effect can be on 401(k) participation. They consider the participation rate of 436 university librarians who work in 11 different buildings throughout campus. Librarians are very highly educated people. In addition, they are specifically trained in how to locate information. The study finds a large difference in participation rates among the different buildings. In one building, 73% of the librarians participate while only 14% participate in a different building. Despite this difference in participation rates, the education level and average annual salary are similar between the librarians in each building. For example, the building with the 14% participation rate earned on average only $2,000 less per year than librarians in the building with the 73% participation rate. The librarians in the building with the next lowest participation rate (of 23%) actually earned an average salary that was $1,000 greater than those in the building with high participation.

Because librarians are such a homogeneous group, the large variation in participation rates is striking. In addition, the usual explanations for such differences in participation are not helpful. One explanation for the large differences is the social norms of each building. The social norms of each peer group develop over time. The norms in some buildings developed to value retirement plans, whereas in other buildings the norms developed so that participation in the retirement plan was not valued.

The degree to which a peer group's social norms affect a particular person depends on the

person's characteristics. For example, some people are not as social as others. Compared to their more social counterparts, people who are less social interact less with neighbors or put themselves less frequently in social settings (such as a bridge club, church, or softball team). Social people enjoy interacting with others and seek opportunities to do so.

Social people are more likely to learn about investing than their less social counterparts because they are frequently exposed to a more social environment. As a consequence, highly social people are more likely to invest in the stock market. Hong, Kubik & Stein (2001) examine the proposition that more socially active households have higher participation in the stock market. They use responses from a survey of 7,500 households in the Health and Retirement Study of Households. A social household is characterized as one in which its members interact with neighbors or attend church. After controlling for other factors such as wealth, race, and education, the researchers find that social households are 4% more likely to invest in the stock market than nonsocial households. Those social households with greater wealth and education levels are 8% more likely to invest, all else being equal. Social households that live in high participation areas are 9% more likely to invest in the stock market if they are socially active.

4.3. The Internet

The rise of the Internet dramatically changed the way people make investment decisions (Barber & Odean, 2000b). The interactive nature of the Internet also creates a social environment where investors can exchange ideas. For example, the Internet fosters active involvement by providing the medium for investment chat rooms, message boards, and newsgroups. Millions of people started investing online over the past several years. In the late 1990s and early 2000, a tremendous surge occurred in investor trading through online brokerage accounts and Web-based trading in 401(k) pension plan accounts. If this online investing behavior magnifies the investor's biases, then trading patterns in those accounts that are consistent with the behavioral predictions of this article should surface. For example, online traders should exhibit signs of overconfidence, such as more frequent trading. Making poor decisions should cause these online investors to experience lower returns.

A good way to test this conjecture is to compare the before and after behavior of investors who switched from a traditional discount brokerage to an online service. Barber and Odean (2002) study 1,607 investors who went online. Switching to the online service caused the investors to nearly double their number of trades. This is also what happened to investors trading in their 401(k) plan over a Web-based service (Choi, Laibson & Metrick, 2002). In addition, the trading decisions worsen after the switch to online trading. For example, before switching to the online service, the stocks these investors bought outperformed the market the next month by 0.14% per month. After switching to the online service, the stocks they purchased under-performed the market by an average of −0.33% per month. The selling decisions (seeking pride and avoiding regret biases) were also poor. The stocks that the online investors sold ended up beating the market by 0.21% per month after they sold them.

5. Overcoming psychological biases

Belsky and Gilovich (1999) contend that no easy fixes exist for many of the psychological biases that affect investors. That is, merely learning about cognitive and emotional weaknesses does not eliminate them. Two key difficulties exist to overcoming psychological biases that result in common investor mistakes. First, although these mistakes often cost investors money, each psychological habit may have a flip side that is beneficial. For example, the tendency to weigh losses more heavily than gains may be a beneficial trait. If investors care too much about potential gains and too little about potential losses, they run a risk of experiencing losses that may threaten their survival. Second, some behavioral biases appear to conflict with one another. For example, investors often overestimate their abilities and knowledge in picking "winners" while blindly following the actions or advice of others.

Both Van Eaton (1999) and Nofsinger (2001) provide numerous suggestions on how investors can shield themselves from various psychological biases. For example, investors who are susceptible to overconfidence, which results in trading too much and taking too much risk, can trade less, especially in taxable accounts, and diversify. Investors who engage in representativeness, which is a shortcut that the brain uses to reduce the complexity of thought, can step back and look at the whole picture instead of placing too much emphasis on a few qualities.

With these difficulties in mind, the following guidelines may be useful in helping to overcome psychological biases that result in common investor mistakes.

- *Understand and avoid psychological biases.* This is easier said than done because investors often have difficulty identifying the psychological habits that affect their financial decision-making. Yet, psychological characteristics play an important role in investor behavior. Overcoming investor mistakes starts with recognizing and avoiding the psychological biases that can reduce wealth.
- *Identify investment objectives and constraints.* To reduce the influence of psychological biases, investors can establish realistic investment objectives in terms of return requirements and risk tolerance. They also need to recognize and allow for various constraints such as liquidity, time horizon, and taxes to achieve their objectives. Having clearly defined, realistic objectives can help investors avoid taking too much risk by trying to "get even." Also, investors can avoid endowment bias in which they fail to achieve a match between their investment objectives and investments.
- *Develop quantitative investment criteria.* By developing a set of quantitative investment criteria, investors can avoid investing on emotion, rumor, and stories or other psychological biases. Following appropriate investment criteria can also help investors achieve their investing goals. Before buying a stock, investors can compare the characteristics of the company to their criteria.
- *Diversify investments.* Portfolio diversification among various asset classes, such as stocks, bonds, money market funds, and real estate with different patterns of returns over time, helps to increase the stability of returns and thus reduce risk. Proper diversification can help investors avoid tragic losses and shield them against the psychological biases of attachment and familiarity. The asset classes and the weights

that investors assign to each asset class within the portfolio are particularly important. Studies by Brinson, Singer & Beebower (1991) and Ibbotson and Kaplan (2000) show that about 90% of overall investment returns arise from the long-term asset allocation decision. Proper asset allocation adds much more value to investment performance than market timing and security selection. Investors who want to reduce their exposure to their psychological weaknesses, such as overconfidence, can take much of the emotion out of investing by switching at least part of their money to index funds.

- *Review and reallocate assets.* Investors should periodically review and keep track of their investments. For example, an investor should review his or her portfolio at least annually and compare it with specific investment goals. If the weights for each asset class diverge too much from the desired weights, the investor can consider reallocating the assets within the portfolio. Taking these actions may help investors overcome psychological biases, such as status quo, endowment, representativeness, and familiarity, and gain control of their investment environment.

6. Future research

Financial economists have only scratched the surface in understanding financial decision-making from a behavioral viewpoint. Much of what has been learned so far has been tested on only one data set. These findings need to be confirmed using other data sets. In addition, the existing evidence leads to further questions. For example, after experiencing a large investment loss, why do some investors avoid taking any risk whereas others increase their risk to recoup the losses? What are the factors that lead to such different reactions?

Another issue involves resolving apparently conflicting research in behavioral finance involving biases. For example, why do people in some cases prefer to hold the investments they already have (endowment affect) and to do nothing (status quo bias), whereas at other times they trade too much (overconfidence)? Why are investors willing to buy more of their own company's stock when the price rises (familiarity bias), whereas others are more likely to sell winning stocks too soon (disposition effect)? Another question for further research is, "Who is buying the stocks that certain investors are selling prematurely?"

Some areas of psychology have not been explored in financial decision-making. For example, does investor intelligence or education influence psychological biases and emotions? What about personality? Personality is characterized by factors such as level of risk aversion, social activity, and need for control. Consequently, personality could play a role in how common psychological problems affect investors.

One area that financial economists are just beginning to explore is the social influences on the investor. When faced with a financial decision, people must weigh the influences of social norms, peer pressure, and expert recommendations when formulating their opinions. Social norms are the beliefs of colleagues. Peer pressure is active influence from a colleague. Consider the plight of the Enron employees when making 401(k) plan contribution decisions. It might appear that most other employees invest in the company stock (social norm). Colleagues may be describing their success from investing in the company stock (peer pressure). Some experts such as finance professors advise diversifying, whereas others such

as chief executive officers recommend buying the company stock. How do these different forms of recommendations influence investors? How do these influences interact with other information, such as the recent stock price trend?

Do these biases affect different cultures in the same way or different ways? Kim and Nofsinger (2002) review the literature on how educational systems and family relations differ between Asian cultures and Western cultures. These differences may lead to a dissimilar view of risk aversion and different psychology. How do the different experiences and history of different cultures affect financial decision-making?

Throughout this review, we identify many instances where investor behavior results in negative abnormal performance. Many authors claim that investors follow price trends or patterns and even push prices away from fundamental value. This does not necessarily mean that informed investors could trade against biased investors to earn excess returns. Although many in the investment industry are trying to profit from the folly of individual investors, it remains to be seen if this is possible. Indeed, we feel this is an empirical issue that merits further research. Can fundamental analysis identify stocks that are mis-priced due to the biases of other investors? Are there technical analysis tools that identify predictable and profitable opportunities caused by biased investors?

For the past several decades, research methods in finance have evolved along the two roads of mathematical modeling and empirical analysis of very large data sets. The profession may find that new methods are needed to fully understand behavioral issues. We may have to adapt experimental methods from psychology and experimental economics. We may even want to explore the usefulness of surveys. These new questions may require new forms of tests.

Acknowledgment

The authors thank Conrad Ciccotello, editor of the *Financial Services Review,* and the two anonymous reviewers for their helpful suggestions.

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