THE PSYCHOLOGY OF INVESTING

JOHN R. NOFSINGER

Seventh Edition

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The Psychology of Investing

While traditional finance focuses on the tools used to optimize return and minimize risk, this book shows how psychology can explain our decisions more than financial theory. Analyzing how investors behave in the real world, this is the first book of its kind to delve into the ways biases influence investment behavior, and how overcoming these biases can increase financial success.

Now in its seventh edition, this classic text features:

- An easy-to-understand structure, illustrating psychological biases as everyday behavior; analyzing their effect on investment decisions; and concluding with academic studies that show real-life investors making choices that hurt their wealth
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Fully updated with the latest research in the field, *The Psychology of Investing* will prove fascinating and educational for advanced students in behavioral finance, investment and portfolio management classes, as well as investors and financial planners.

John R. Nofsinger is the William H. Seward Endowed Chair in International Finance and Dean of the College of Business and Public Policy at the University of Alaska Anchorage, USA.

"John Nofsinger's *The Psychology of Investing* has become a modern classic. The 7th edition features new content on fintech and cryptocurrencies, the role of social media in investing, generational biases, and the COVID-19 pandemic. Anyone interested in keeping abreast of the latest developments on the behavioral side of investing should find this latest edition indispensable."

— H. Kent Baker, *University Professor of Finance, American University*

The Psychology of Investing

7th Edition

John R. Nofsinger

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For Anna, my wife and best friend

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Preface

An old Wall Street adage states that two factors move the market: fear and greed. Many people would say that fear dominated the markets at the beginning of the COVID-19 pandemic and greed dominated the actions of the meme stock investors throughout 2021. Although true, this characterization is far too simplistic. The human mind is so sophisticated and human emotions are so complex that the emotions of fear and greed do not adequately describe the psychology that affects people as they make investment decisions. This book is one of the first to delve into this fascinating and important subject.

Few other books provide this information because traditional finance has focused on developing the tools that investors use to optimize expected return and risk. This endeavor has been fruitful, yielding tools such as asset pricing models, portfolio theories, and option pricing. Although investors should use these tools in their investment decision making, they typically do not. This is because psychology affects our decisions more than financial theory does. Unfortunately, psychological biases inhibit one's ability to make good investment decisions. By learning about your psychological biases, you can overcome them and increase your wealth.

You will notice that most of the chapters are structured similarly. A psychological bias is first described and illustrated with everyday behavior (like driving a car). The effect of the bias on investment decisions is then explained. Finally, academic studies are used to show that investors do indeed exhibit the problem. What we know about investor psychology is increasing rapidly and thus there are changes in all chapters from the previous edition. This seventh edition of *The Psychology of Investing* has a new first-of-its-kind chapter that describes the behavior of the meme investors and the short squeeze created in GameStop stock.

This material does not replace the investment texts of traditional finance. Understanding psychological biases complements the traditional finance tools.

New to This Edition

Chapter 1: Psychology and Finance

- Updates to include a discussion of the new meme investor

Chapter 2: Overconfidence

- Added a paragraph and a paper on trading by Robinhood users

Chapter 3: Pride and Regret

- Added a discussion and a paper on tax awareness reducing the disposition effect

Chapter 4: Risk Perceptions

- Added a discussion and a paper on investors freaking out and panic selling

Chapter 5: Decision Frames

- Added two paragraphs and a paper about 401(k) plan investment choices and alphabeticity bias
- Added a paragraph and paper about left-digit bias

Chapter 6: Mental Accounting

- A new subsection on mental money laundering

Chapter 7: Forming Portfolios

- Added new discussion on behavioral portfolio theory and its difference from modern portfolio theory
- A new subsection on the characteristics of behavioral portfolios and a new paper

Chapter 8: Representativeness and Familiarity

- Expanded the home bias discussion to include what happens when investors move to another country with a new paper

Chapter 9: Social Interaction and Investing

- Rewrote introduction to include Hirshleifer's 2020 AFA Presidential Address on social economics and finance
- Added a study on being social and trading activity

- Added a subsection on the Wincapita Ponzi scheme
- Enhance several sections with new papers

Chapter 10: Emotion and Investment Decisions

- Added a subsection on a new music-based sentiment measure
- Added a discussions of a new news photo-based pessimism index

Chapter 11: Self-Control and Decision Making

- In Choice Architecture sections
- Added fresh starts paper
- Added discussion about the persistence of nudges
- Added finding that lottery-linked savings plans not only increase saving rates but also reduce gambling

Chapter 12: The Physiology of Investing

- Added a subsection on genetic endowments and stock market participation
- Added reference for stock market return correlation with deaths

Chapter 13: The Meme Investors of 2021

- This is a new chapter

CHAPTER

1 Psychology and Finance

Fear was thick in the air at the start of the financial crisis. The government was clearly worried about a system-wide financial failure. Any observer could see that the Feds were frantically throwing unprecedented and dramatic solutions at the problems. They force-fed the largest banks tens of billions of dollars each. They took over other financial institutions like mortgage firms Fannie Mae and Freddie Mac and insurer AIG (American International Group), taking on hundreds of billions more in liabilities.

Through the first three quarters of 2008, the stock market declined 18 percent as measured by the Dow Jones Industrial Average. In the fourth quarter, during the panic, the market lost another 19 percent. The losses accelerated in the first quarter of 2009. The market declined 25 percent to a low on March 5, 2009. Of course, investors did not know that was the bottom. All they knew was that the market had declined for over a year and by a total of more than 50 percent. In addition, the losses had been most dramatic recently. What were individual investors doing during this time? They were selling stocks. They sold more than $150 billion of stock mutual funds these two quarters. Much of this was at or near the market bottom. As a comparison, the same investors were net buyers of $11 billion in stock mutual funds during the month of the market top. Even into 2012, individual investors were not buying into the stock market like they did before. Once bitten, twice shy?

Intellectually, we all know that we need to buy low and sell high in order to make money in stocks. Yet, as these numbers illustrate, individual investors are notoriously bad market timers. Our psychological biases are particularly destructive during times of large market swings because emotions get magnified.

But it wasn't just individual investors' cognitive biases that were exposed during this time of economic turmoil—the errors of finance professionals were also laid bare. These corporate and institutional investors tend to create elaborate models to describe all the factors impacting investment prices. Over time, they become too reliant on these

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models. Their overconfidence leads to greater risk-taking. At some point, and unbeknownst to them, they have risked the life of their firm. Then the unexpected occurs. Nassim Taleb calls it a *Black Swan*—after the European assumption that all swans were white—that is, until they went to Australia and, much to their surprise, found black swans. This time, the rare and important event was that U.S. housing prices started to decline, and people started defaulting on their mortgages.

Many financial institutions found that, in their hubris, they had over-leveraged themselves and were quickly sinking. Hundreds of banks failed. Investment banks were liquidated or experienced a forced sale. Large commercial banks were bailed out by the government. Hedge funds were liquidated. Finance professionals had bet their firms and their careers on their models and lost.

Why do investors and financial professionals frequently make poor decisions? Although some people may be ill-informed or poorly trained, these mistakes are often made by highly intelligent and well-trained individuals. All these problems stem from cognitive errors, psychological biases, and emotions. These problems are not discussed in traditional finance education. These topics are described in what is known as *behavioral finance*.

Traditional Versus Behavioral Finance

Historically, a formal education in finance has dismissed the idea that one's personal psychology can be a detriment in making good investment decisions. For the past four decades, the field of finance has evolved based on the following two assumptions:

- People make rational decisions.
- People are unbiased in their predictions about the future.

By assuming that people act in their own best interests, the finance field has been able to create some powerful tools for investors. For example, investors can use modern portfolio theory to obtain the highest expected return possible for any given level of risk they can bear. Pricing models (such as the capital asset pricing model, the arbitrage pricing theory, and option pricing) can help value securities and provide insights into expected risks and returns. Investment texts are full of these useful theories.

However, psychologists have known for a long time that these are bad assumptions. People often act in a seemingly irrational manner and make predictable errors in their forecasts. For example, traditional finance assumes that people are risk averse. They prefer not to take risks but will do so if the expected rewards are sufficient. People should also be consistent in their level of risk aversion. But in the real world, people's behaviors routinely violate these assumptions. For instance, people exhibit risk aversion when buying insurance and simultaneously exhibit a risk-seeking behavior when buying lottery tickets.

The finance field has been slow to accept the possibility that economic decisions could be predictably biased. Early proponents of behavioral finance often were considered heretics. Over the past decade though, the evidence that psychology and emotions influence financial decisions became more convincing. Today, the early proponents of behavioral finance are no longer heretics, but visionaries. Although the controversies continue on when, how, and why psychology affects investing, many believe that the 2002 Nobel Prize in Economics awarded to psychologist Daniel Kahneman and experimental economist Vernon Smith has vindicated the field. Then Robert Shiller won the prize in 2013, showing the increasing popularity of behavioral finance in the field of financial economics. Robert Shiller is a prolific Yale University behavioral economist and author of the popular book *Irrational Exuberance*. The 2017 prize went to Richard H. Thaler "for his contributions to behavioural economics."

Financial economists are now realizing that investors can be irrational. Indeed, predictable decision errors by investors can affect the function of the markets. The contributions of behavioral finance include (1) documenting actual investor behavior; (2) documenting price patterns that seem inconsistent with traditional models with rational investors; and (3) providing new theories to explain these behaviors and patterns.[1]

Perhaps most important, people's reasoning errors affect their investing and ultimately their wealth. Investors who understand the tools of modern investing still can fail as investors if they let psychological biases control their decisions. By reading this book, you will:

- learn many psychological biases that affect decision making;
- understand how these biases affect investment decisions;
- see how these decisions reduce your wealth; and
- learn to recognize and avoid them in your own life.

The rest of this chapter will illustrate that these psychological problems are real. The arguments will be far more convincing if you participate in the following demonstration.

Prediction

The brain does not work like a computer. Instead, it frequently processes information through shortcuts and emotional filters to shorten analysis time. The decision arrived at through this process is often not the same decision you would make without these filters. These filters and shortcuts can be referred to as psychological biases. Knowing about these psychological biases is the first step toward avoiding them. One common problem is overestimating the precision and importance of information. The following demonstration illustrates this problem.

Let's face it, investing is difficult. You must make decisions based on information that might be inadequate or inaccurate. Additionally, you must understand and analyze the information effectively. Unfortunately, people make predictable errors in their forecasts.

TABLE 1.1 Enter the Range (Minimum and Maximum) for Which You Are 90 Percent Certain the Answer Lies Within

	Min	Max
1. What is the average weight, in pounds, of the adult blue whale?	_____	_____
2. In what year was the *Mona Lisa* painted by Leonardo da Vinci?	_____	_____
3. How many independent countries were members of the United Nations in 2022?	_____	_____
4. What is the air distance, in miles, between Paris, France, and Sydney, Australia?	_____	_____
5. How many bones are in the human body?	_____	_____
6. How many total combatants were killed in World War I?	_____	_____
7. How many items (books, manuscripts, microforms, sheet music, etc.) were listed in the U.S. Library of Congress at the end of 2021?	_____	_____
8. How long, in miles, is the Amazon River?	_____	_____
9. How fast does the earth spin (miles per hour) at the equator?	_____	_____
10. How many earthquakes per year does the National Earthquake Information Center locate and publish information about, globally?	_____	_____

Consider the ten questions in Table 1.1.[2] Although you probably do not know the answers to these questions, enter the most probable range based on your best estimate. Specifically, give your best low guess and your best high guess so that you are 90 percent sure the answer lies somewhere between the two. Don't make the range so wide that the answer is guaranteed to lie within the range, and also don't make the range too narrow. If you consistently choose a range following these instructions, you should expect to get nine of the ten questions correct. Go ahead, give it your best shot.

If you have no idea of the answer to a question, then your range should be wide for you to be 90 percent confident. On the other hand, if you think you can give a good, educated guess, then you can choose a smaller range to be 90 percent confident.

Now let's check the answers. They are: (1) 250,000 pounds; (2) 1513; (3) 193 countries; (4) 10,543 miles; (5) 206 bones; (6) 8.3 million; (7) 170 million items; (8) 4,000 miles; (9) 1,044 miles per hour; and (10) 20,000. Count your response correct if the answer lies between your low and high guesses. How many did you get right?

Most people miss five or more questions. However, if you are 90 percent sure of your range, then you should have missed only one. The fact is that you are too certain about your answers, even when you have no information or knowledge about the topic. Even being educated in probability is of no help. Most finance professors miss at least five of the questions, too.

This demonstration illustrates that people have difficulty evaluating the precision of their knowledge and information. Now that you see the difficulty, you can have a

chance to redeem yourself. Because this book relates psychology to investing, consider the following question:

> In 1928, the modern era of the Dow Jones Industrial Average (DJIA) began as it expanded to 30 stocks. In 1929, the index started the year at 300. At the end of 2016, the DJIA was at 19,787. The DJIA is a price-weighted average. Dividends are omitted from the index. What would the DJIA average have been at the end of 2016 if the dividends were reinvested each year?

What are your DJIA minimum and maximum guesses? Again, you should be 90 percent sure that the correct value lies within the range you choose.

Because you are 90 percent sure that the correct value lies within the range you chose, you should get this one correct. Are you ready for the answer? If dividends were reinvested in the DJIA, the average would have been 613,514 at the end of 2016.[3] Does this surprise you? Does it seem impossible? Let me reframe the problem from prices to returns. Using my financial calculator, I find that the average annual return of 300 growing to 613,514 over 88 years is 9.05 percent. Does a nearly 9 percent average return in the stock market seem reasonable? Even after learning that most people set their prediction range too narrowly and experiencing the problem first-hand, most people continue to do it. Also, notice how important is the framing of the problem.

This example also illustrates another aspect of investor psychology called *anchoring*. When you read the question, you focused on the DJIA price level of 19,787. That is, you anchored your thinking to 19,787. You probably made your guess by starting at this anchor and then trying to add an appropriate amount to compensate for the dividends. Investors anchor on their stock purchase price and the recent highest stock price.

Behavioral Finance

Even the smartest people are affected by psychological biases, but traditional finance has considered this irrelevant. Traditional finance assumes that people are "rational" and tells us how people should behave to maximize their wealth. These ideas have brought us arbitrage theory, portfolio theory, asset pricing theory, and option pricing theory.

Alternatively, behavioral finance studies how people actually behave in a financial setting.[4] Specifically, it is the study of how emotions and cognitive biases affect financial decisions, corporations, and the financial markets. This book focuses on a subset of these issues—how psychological biases affect investors. The investor who truly understands these biases will also appreciate more fully the tools traditional finance has provided.

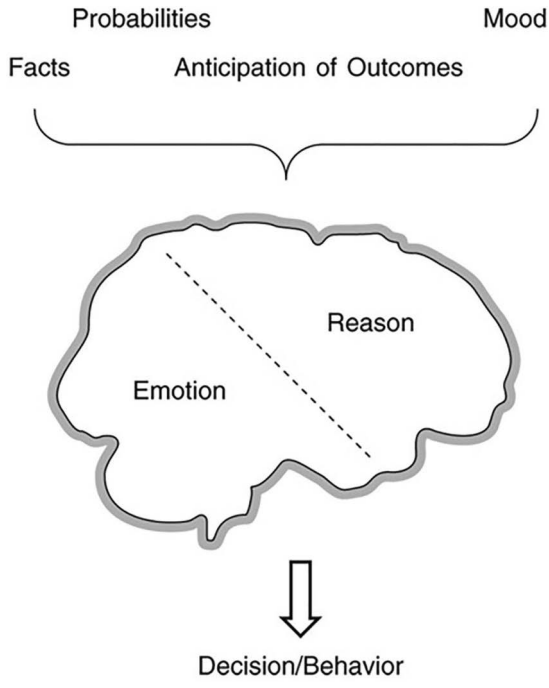

FIGURE 1.1 Decision-Making Process

To begin, consider the decision-making process shown in Figure 1.1. To evaluate a decision that includes risk and/or uncertainty, the brain uses inputs such as the facts of the situation and probability estimates to attempt to quantify the uncertainties. However, both the current mood and the anticipated feelings about the result of the decision also become inputs. It should be no surprise that when emotions get involved in the process, biased decisions often result. We often think of this part of the process as being more computer-like. Possibly more interesting is that the "computer-like" part of the cognitive process (i.e., the reason, or logic, portion of the brain) also yields systematic and predictable cognitive errors. Thus, decisions and the results of those decisions are often biased no matter whether emotion plays a role.

Sources of Cognitive Errors

Many of the behaviors of investors are outcomes of *prospect theory*. This theory describes how people frame and value a decision involving uncertainty.[5] First, investors frame the choices in terms of potential gains and losses relative to a specific reference point. Framing is a common and pervasive behavior that has a strong ability to influence opinions and decisions (see Chapter 5). Although investors seem to anchor on various reference points, the purchase price appears to be important. Second, investors value the gains/losses according to an *S*-shaped function, as shown in Figure 1.2.

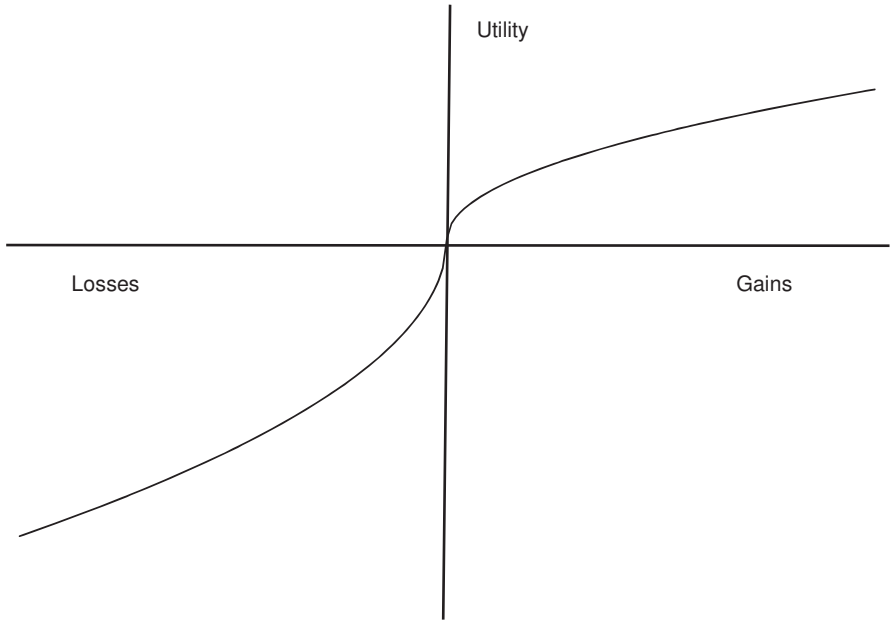

FIGURE 1.2 Prospect Theory Value Function

Notice several things about the value function in the figure. First, the function is concave for gains. Investors feel good (i.e., have higher utility) when they make a $500 gain. They feel better when they make a $1,000 gain. However, they do not feel twice as good when they gain $1,000 as when they gain $500.

Second, notice that the function is convex for taking a loss. This means that investors feel bad when they have a loss, but twice the loss does not make them feel twice as bad.

Third, the function is steeper for losses than for gains. This asymmetry between gains and losses leads to different reactions in dealing with winning and losing positions (see Chapter 3). An additional aspect of prospect theory is that people segregate each investment to track gains and losses and periodically re-examine positions. These separate accounts are referred to as *mental accounting* (see Chapter 6).[6] Viewing each investment separately rather than using a portfolio approach limits investors' ability to minimize risk and maximize return (see Chapter 7).

A different approach to the psychology of investing is to categorize behavioral biases by their source.[7] Some cognitive errors result from *self-deception*, which occurs because people tend to think they are better than they really are. This self-deception helps them fool others and thus survive the natural selection process. Another source of bias comes from *heuristic simplification*. Simply stated, heuristic simplification exists because constraints on cognitive resources (like memory, attention, and processing power) force the brain to shortcut complex analyses. Prospect theory is considered an outcome of

heuristic simplification. A third source of bias comes from a person's *mood*, which can overcome reason.

Human interaction and peer effects are also important in financial decision making. Human interactions are how people share information and communicate feelings about the information. The cues obtained about the opinions and emotions of others influence one's decisions.

Bias and Wealth Impact

This book demonstrates how psychological biases, cognitive errors, and emotions affect investor decisions. It also shows the wealth ramifications of these biased decisions. In other words, not only do people make predictable errors, but those errors cost them financially. The primary goal of this book is to help you understand and control the biases in yourself and those with whom you interact. In addition, some readers may find opportunities to financially benefit from the biased decisions of other investors.

As an example, consider that people place too much emphasis on the few observations they have witnessed to make predictions about future outcomes. First consider the three outcomes of flipping a coin: head, head, and head. We know that we should expect there to be equal numbers of heads and tails in the long run. Observing an imbalance like three heads leads people to behave as if there is a greater chance of a tail on the next flip. Because we know the underlying distribution (50 percent chance of heads, 50 percent chance of tails), we tend to believe in a correction. This is known as the *gambler's fallacy* and is part of a larger misunderstanding referred to as the *law of small numbers*.[8]

Consider how this behavior impacts those who play the lottery. In the long run, people know that each number in a lottery should be picked an equal number of times. So they tend to avoid numbers that have been recently picked because it seems less likely that they should be picked again so soon. This fallacy biases people toward picking lottery numbers that have not been picked in a while. You might ask how this impacts their wealth; after all, the numbers they pick are equally as likely to be chosen as any others. Say that everyone who plays the lottery (except me) avoids the numbers that have recently been picked. I select the recent numbers. Remember that lottery jackpots are split between all the winners. If my numbers get chosen in the lottery, I am the only winner and get to keep the entire jackpot. If you are the winner, you are likely to split with others and thus receive only a small share of the jackpot. Our probabilities of winning are the same, but, by following the crowd of people suffering from gambler's fallacy, you would have a smaller expected payoff. Notice that by understanding this bias, I am able to change my decisions to avoid it and better position myself to make more money than those who suffer from it.

Belief in the law of small numbers causes people to behave a little differently in the stock market. With coins and lotteries, we believe that we understand the underlying

distribution of outcomes. But we don't know the underlying distribution of outcomes for different stocks and mutual funds. In fact, we believe that some stocks and mutual funds are better than others. Here we take the small number of observations we see as representative of what to expect in the future. Unusual success is believed to continue. When people believe they understand the underlying distribution of outcomes, they predict unusual occurrences to reverse. Alternatively, when they do not know the underlying distribution, they predict unusual performance to continue. We thus see investors "chase" last year's high-performing mutual funds.

What to Expect

The next seven chapters of this book discuss psychological biases that affect people's daily lives. These chapters are all structured in a similar manner. First, the psychological trait is identified and explained using common, daily activities as examples. Second, the results of research studies show how the bias affects real people. Last, the degree to which investors are affected by the bias is examined.

Chapters 2 through 4 demonstrate how investment decision making is affected by emotions and framing. As illustrated in the previous example, people set their range of possible outcomes too narrowly. This is part of a self-deception problem called *overconfidence*. Over-confident investors trade too much, take too much risk, and earn lower returns. This topic is discussed in Chapter 2. Chapter 3 illustrates how investors' views of themselves cause them to avoid feelings of regret and instead seek pride. Consequently, investors sell winner stocks too soon and hold on to loser stocks too long. Last, Chapter 4 demonstrates investors' perceptions of risk and how they change from time to time and from analysis to analysis. This changing risk behavior has a dramatic impact on the decision-making process. Indeed, your memory of the past might change over time to soften your regret over failures.

Chapters 5 through 8 demonstrate how heuristic simplification affects the investor. For example, even feeling whether a stock you hold is a winner or loser involves *framing* (Chapter 5). Consider that you bought a stock for $30 five years ago. That stock rose to $60 last year, but now is at only $45. Do you consider this stock to be a winner or a loser for you? Your decision on this frame will lead you to specific holding or selling behaviors. Now consider that every day you are bombarded by information; the brain uses a process called *mental accounting* to store and keep track of important decisions and outcomes. Chapter 6 shows that people make poor financial decisions as a consequence of this process. Discussed in Chapter 7 is one particularly important implication—how investors view portfolio diversification. The brain also uses shortcuts to process information quickly. These shortcuts create a tainted view of the information. This leads to the problems of representativeness and familiarity for the investor. These problems are discussed in Chapter 8.

The next three chapters are a little different. Chapter 9 discusses how investing has entered our social culture. The interaction between psychology, group psychology, and investing

can contribute to market mania and price bubbles. The Internet also interacts with these factors to magnify the psychological biases. This is important because investors are influenced by the decisions being made around them. Chapter 10 focuses on the role of emotions and mood in the decision-making process. An investor's general level of optimism or pessimism influences his or her trading decisions. Chapter 11 discusses the difficulty of maintaining self-control in the face of these psychological biases. Planning, incentives, and rules of thumb are helpful in avoiding common problems. This chapter also describes programs (such as Save More Tomorrow and Save to Win) that are designed using people's biases to help them save more.

The last two chapters are different again. Chapter 12 illustrates the role biology plays in investment and savings behavior. In this new and exciting field, scholars are learning how genetics, gender, hormones, physiology, and cognitive aging drive investment preferences. Neuroscience is also showing us what happens in the brain during investment decision making. There is an age-old question that asks whether a person's behavior stems from nature or nurture. This chapter shows that at least some of it is driven by nature. Chapter 13 discusses the GameStop short squeeze in which individual investors ganged up to take advantage of hedge funds and other institutional investors. Quite a twist from normal. These new meme investors interacted through social media and traded via no-commission brokers like Robinhood. There is a lot of behavioral finance to discuss!

Summary

Most formal finance education centers on traditional finance concepts. However, psychology plays a large role in financial decision making. This book demonstrates how cognitive errors, heuristics, psychological biases, and emotions influence an investor's decisions. Unfortunately, these psychology-induced decisions create outcomes that often have negative impacts on wealth.

Questions

1. Why might the traditional assumption of rational decision making make sense for investors?
2. Name four aspects of prospect theory.
3. Describe three sources of cognitive errors other than prospect theory.
4. How do emotions and moods contribute to a person's decision-making process?

Notes

1. For a discussion, see Annette Vissing-Jorgensen, "Perspectives on Behavioral Finance: Does 'Irrationality' Disappear With Wealth? Evidence From Expectations and Actions," *NBER Macroeconomics Annual* 18 (2003): 139–194.
2. This exercise is similar to one proposed in the book *Decision Traps* (New York: Simon & Schuster, 1989) by Edward Russo and Paul Shoemaker, and a presentation by Hersh Shefrin at the 2000 Financial Management Association annual meeting.

3. This is an extension of the analysis done in Roger Clarke and Meir Statman's, "The DJIA Crossed 652,230," *Journal of Portfolio Management* 26 (Winter 2000): 89–93.
4. See the discussion in Meir Statman, "Behavioral Finance: Past Battles and Future Engagements," *Financial Analysts Journal* 55 (November/December 1999): 18–27. I use the term *traditional finance* where Meir uses the term *standard finance*.
5. Daniel Kahneman and Amos Tversky, "Prospect Theory: An Analysis of Decision Under Risk," *Econometrica* 46 (1979): 171–185.
6. Richard Thaler, "Mental Accounting and Consumer Choice," *Marketing Science* 4 (1985): 199–214.
7. David Hirshleifer, "Investor Psychology and Asset Pricing," *Journal of Finance* 56 (2001): 1533–1597.
8. Matthew Rabin, "Inference by Believers in the Law of Small Numbers," *Quarterly Journal of Economics* 117 (2002): 775–816.

CHAPTER

2 Overconfidence

People can be overconfident. Psychologists have determined that overconfidence causes people to overestimate their knowledge, underestimate risks, and exaggerate their ability to control events. Does overconfidence occur in investment decision making? Security selection is a difficult task. It is precisely in this type of task that people exhibit the greatest degree of overconfidence.

There are two aspects to overconfidence: miscalibration and the better-than-average effect. The miscalibration facet is that people's probability distributions are too tight. The illustration in Chapter 1 using the ten questions and 90 percent range responses is an example of miscalibration. The better-than-average effect simply means that people have unrealistically positive views of themselves. They believe that their abilities, knowledge, and skills are better than the average person's. An illustration of this effect is the answer to the following question:

> Are you a good driver? Compared to the drivers you encounter on the road, are you above average, average, or below average?

How did you answer this question? If overconfidence were not involved, approximately one-third of you would answer *above average*, one-third would say *average*, and one-third would say *below average*. However, people are overconfident about their abilities. In one published study, 82 percent of the sampled college students rated themselves above average in driving ability.[1] Clearly, many of them are mistaken.

Many of those students were mistaken because they were overconfident about their driving skills. Being overconfident about driving skills might not be a problem that affects your life, but people are overconfident about their skills in many things. This overconfidence can even affect your financial future.

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Consider this financially oriented example. Starting a business is a risky venture; in fact, most new businesses fail. When 2,994 new business owners were asked about their chances of success, they thought they had a 70 percent chance of success, but only 39 percent thought that any business like theirs would be as likely to succeed.[2] Why do new business owners think they have nearly twice the chance of success as others? They are overconfident.

Interestingly, people are more overconfident when they feel they have control over the outcome—even when this is clearly not the case. For example, it is documented that if people are asked to bet on whether the result of a coin toss will be heads or tails, most bet larger amounts if the coin is yet to be tossed. That is, if the coin is tossed and the outcome is concealed, people will offer lower amounts when asked for bets. On the other hand, if asked for a bet before the toss, people tend to bet higher amounts. People act as if their involvement will somehow affect the outcome of the toss.[3] In this case, control of the outcome is clearly an illusion. This perception occurs in investing as well. Even without information, people believe the stocks they own will perform better than stocks they do not own. However, ownership of a stock only gives the illusion of having control over the performance of the stock.

A Gallup/Paine Webber survey of individual investors 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 percent. When asked what return they expected to earn on their portfolios, the average response was 11.7 percent. Typically, investors expect to earn an above-average return.

Overconfidence Affects Investor Decisions

Investing is a difficult process. It entails gathering information, analyzing it, and making a decision based on that information. However, overconfidence causes us to misinterpret the accuracy of our information and overestimate our skill in analyzing it. It occurs after we experience some success. The *self-attribution* bias leads people to believe that successes are attributed to skill while failure is caused by bad luck. After some success in the market, investors may exhibit overconfident behavior.

Consider the behavior of financial analysts. Analysts publicize their predictions about the future earnings of the firms they follow. Gilles Hilary and Lior Menzly studied the predictions of analysts after the analysts had achieved a series of good earnings estimates.[4] If this success causes the analysts to put excessive weight on their private information and skill, then their next predictions are likely to be less accurate than average and deviate from the other analysts. After examining over 40,000 quarterly earnings predictions, Hilary and Menzly found that success leads to overconfidence. Analysts

who perform well for a few quarters follow with predictions that are different from other analysts' estimates and ultimately have greater errors.

Overconfidence can lead investors to poor trading decisions, which often manifest themselves as excessive trading, risk-taking and, ultimately, portfolio losses. Their overconfidence increases the amount they trade because it causes them to be too certain about their opinions. Investors' opinions are derived from their beliefs regarding the accuracy of the information they have obtained and their ability to interpret it.[5] Overconfident investors believe more strongly in their own valuation of a stock and concern themselves less about the beliefs of others.

Overconfident Trading Psychologists have found that men are overconfident to a greater degree than women in tasks perceived to fall into the masculine domain, such as managing finances.[6] Men generally are more overconfident about their ability to make investment decisions than are women; therefore, male investors trade more frequently than female investors do.

Two financial economists, Brad Barber and Terrance Odean, examined the trading behavior of nearly 38,000 households of a large discount brokerage firm over a six-year period.[7] They examined the level of trading in brokerage accounts owned by single and married men and women. A common measure for the level of trading is called *turnover*. Turnover is the percentage of stocks in the portfolio that changed during the year. For example, a 50 percent turnover during a year is the equivalent to an investor selling half the stocks in a portfolio during that year and purchasing new stocks. Similarly, a 200 percent turnover is equivalent to an investor selling all the stocks in the portfolio to purchase others, then selling those stocks to purchase a third set, all during the year.

The study shows that single men trade the most. As illustrated in Figure 2.1, single men trade at a rate equivalent to an 85 percent annual turnover. This compares with an annual turnover of 73 percent for married men. Married and single women trade only the equivalent of 53 percent and 51 percent, respectively, in annual turnover. Note that this is consistent with overconfidence; that is, male investors have greater overconfidence than female investors, leading to higher levels of trading.

On the other hand, it is possible that men are not overconfident but rather that they might be better informed. If you truly have better information, trading based on that information should lead to achieving higher returns.

In general, overconfident investors trade more—but is higher turnover and increased trading bad? Barber and Odean also explore this issue.[8] In a sample of 78,000 household accounts over a six-year period, they examined the relationship between turnover and portfolio returns. Consider an investor who receives accurate information and is highly capable of interpreting it. The investor's high frequency of trading should result in high returns due to the individual's skill and the quality of the information. In fact, these

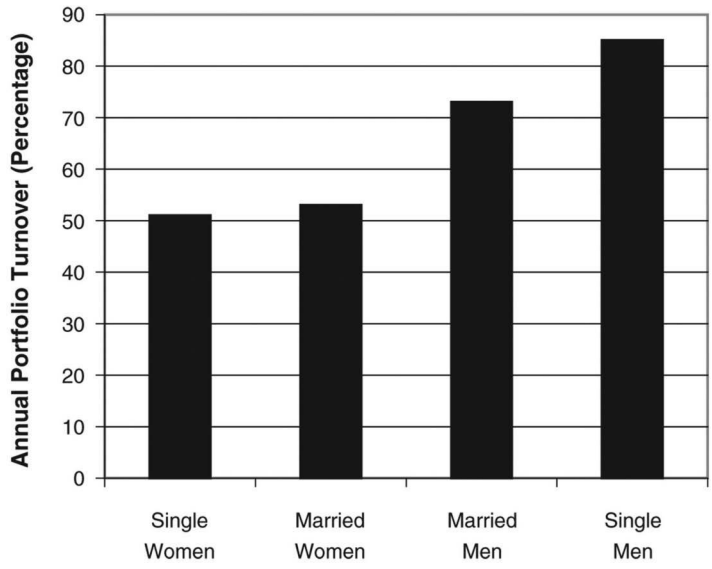

FIGURE 2.1 Annual Portfolio Turnover by Gender and Marital Status

returns should be high enough to beat a simple buy-and-hold strategy while covering the costs of trading. On the other hand, if the investor does not have superior ability but rather is suffering from a dose of overconfidence, then the high frequency of turnover will not result in portfolio returns large enough to beat the buy-and-hold strategy and cover costs.

Barber and Odean determined the level of trading for the investors in their sample and categorized them into five groups. The first 20 percent of investors, with the lowest turnover rate, were placed in the first group. On average, this group turned over their portfolio at a rate of 2.4 percent per year. The 20 percent of investors with the next-lowest turnover rate were placed in the second group. This process continued until the investors with the highest turnover rate were placed in the fifth (and last) group. This high-turnover rate group had an average annual turnover rate of more than 250 percent per year.

Figure 2.2 reports the average annual return for each of the five groups. Note that all five groups earned the same 18.7 percent annually in gross returns. Therefore, high-turnover investors did not realize higher returns for their additional efforts. However, commissions must be paid for buying and selling stocks. This has a greater effect on the investors who trade more frequently, as illustrated in the figure. Net returns (returns after commission costs) to the investor are much lower for the high-turnover group. The net returns for the lowest-turnover group average 18.5 percent per year versus 11.4 percent for the highest-turnover group.

The net difference of 7 percent per year between the highest- and lowest-turnover groups is dramatic. For example, if the investors in the lowest-turnover group invest $10,000 over five years, earning 18.5 percent per year, they will have $23,366. If the

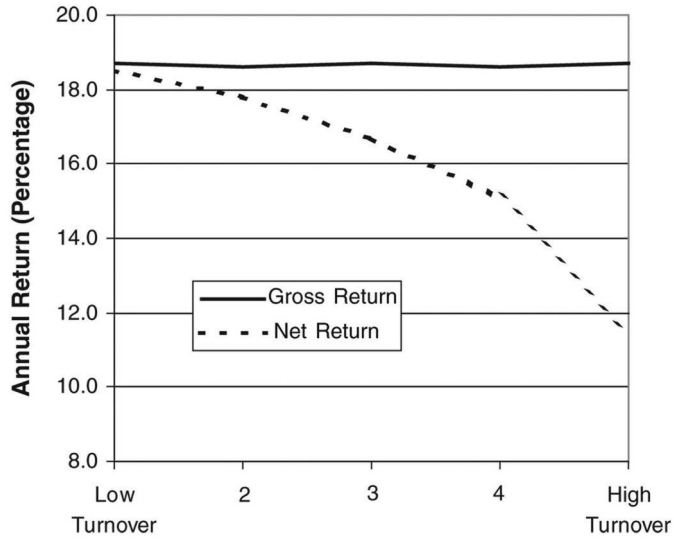

FIGURE 2.2 Annual Return of Investors Sorted by Portfolio Turnover

investors in the highest-turnover group invest the same amount and receive 11.4 percent per year, they can expect only $17,156—a difference of more than $5,000. Overconfidence-based trading is hazardous when it comes to accumulating wealth.

High commission costs are not the only problem caused by excessive trading. It has been observed that overconfidence leads to trading too frequently as well as to purchasing the wrong stocks. Barber and Odean limited their analysis to a sample of brokerage accounts that had complete liquidations of a stock followed by the purchase of a different stock within three weeks. Then they followed the performance of the stocks sold and purchased over the subsequent four months and one year.

They wanted to determine whether selling stock A and purchasing stock B typically was a good decision. Apparently not. The stocks that investors sold earned 2.6 percent during the following four months, whereas the replacement stocks earned only 0.11 percent. In the year following the trades, stocks that had been sold outperformed stocks purchased by 5.8 percent.[9] Not only does overconfidence cause you to trade too much and burn money on commissions, but it can also cause you to sell a good-performing stock in order to purchase a poor one.

One criticism of the Barber and Odean studies is that they essentially assume that high-volume traders are overconfident. In other words, they use trading volume as an indication of overconfidence. However, does overconfidence really cause overtrading? Markus Glaser and Martin Weber examined this question by studying investors at an online German brokerage.[10] They surveyed the investors by asking questions to assess their level of overconfidence. For example, they asked questions like "What percentage of the customers of your brokerage have better skills than you in identifying stocks with

above-average return prospects?" Because the authors had the investors' past portfolio positions and trading records, they could assess whether the investors really were better skilled. Interestingly, they found no correlation between investors' answers and historical differences in performance. They found, however, that this better-than-average measure of overconfidence is positively related to trading volume. Overconfident investors did trade more.

Overconfidence and the Market If many investors suffer from overconfidence at the same time, then signs reflecting such a trend might be found within the stock market. While the excessive trading of overconfident investors has been identified through brokerage accounts, does this behavior show up in the aggregate market? Several researchers believe that it does. Specifically, after the overall stock market increases, many investors may attribute their success to their own skill and become overconfident. This will lead to greater trading by a large group of investors and may impact overall trading volume on the stock exchanges.

Examining monthly stock market returns and trading volume over 40 years shows that higher volume does follow months with high returns.[11] For example, a relatively high return of 7 percent one month is associated with higher trading during the following six months. The extra trading represents seven months of normal trading squeezed into six months. Alternatively, overall trading is lower after market declines. Investors appear to attribute the success of a good month to their own skill and begin trading more. Poor performance makes them less overconfident and is followed by lower trading activity. This may be why the old Wall Street adage warns investors not to confuse brains with a bull market!

Overconfidence and Risk

Overconfidence also affects investors' risk-taking behavior. Rational investors try to maximize returns while minimizing the amount of risk taken. However, overconfident investors misinterpret the level of risk they take. After all, if an investor is confident that the stocks picked will have a high return, then where is the risk?

The portfolios of overconfident investors will have higher risk for two reasons. First is the tendency to purchase higher-risk stocks. Higher-risk stocks are generally from smaller, newer companies. The second reason is a tendency to underdiversify their portfolios. Prevalent risk can be measured in several ways: portfolio volatility, beta, and the size of the firms in the portfolio. Portfolio volatility measures the degree of ups and downs the portfolio experiences. High-volatility portfolios exhibit dramatic swings in price and are indicative of underdiversification. Beta is a variable commonly used in the investment industry to measure the riskiness of a security. It measures the degree a portfolio changes with the stock market. A beta of 1 indicates that the portfolio closely follows the market. A higher beta indicates that the security has higher risk and will exhibit more volatility than the stock market in general.

The series of studies by Barber and Odean show that overconfident investors take more risks. They found 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 and the highest beta and tend to include the stocks of smaller companies. Among the five groups of investors sorted by turnover, the high-turnover group invested in stocks of smaller firms with higher betas compared with the stocks of the low-turnover group. Overall, overconfident investors perceive their actions to be less risky than generally proves to be the case.

Illusion of Knowledge

Where does overconfidence come from? It comes partially from the illusion of knowledge. This refers to the tendency for people to believe that the accuracy of their forecasts increases with more information; that is, more information increases one's knowledge about something and improves one's decisions.[12]

However, this is not always the case. For example, if I roll a fair, six-sided die, what number do you think will come up, and how sure are you that you are right? Clearly, you can pick any number between 1 and 6 and have a one-sixth chance of being right. Now let me tell you that the last three rolls of the die have each produced the number 4. I will roll the die again. What number do you think will come up, and what is your chance of being right? If the die is truly fair, then you could still pick any number between 1 and 6 and have a one-sixth chance of being correct. The added information does not increase your ability to forecast the roll of the die. However, many people believe the number 4 has a greater chance (more than one-sixth) of being rolled again. Others believe the number 4 has a lower chance of being rolled again. These people think their chance of being right is higher than reality. That is, the new information makes people more confident of their predictions even though their chances for being correct do not change.

Although valuable information may improve prediction accuracy, it may increase confidence at a faster rate than accuracy. In other words, receiving more and better information causes one's confidence in making predictions to jump quickly while that information only marginally improves accuracy, if at all. A series of experiments trying to predict college football game outcomes illustrates this effect.[13] Participants were given some statistical information (but no team names) and asked to predict the winner and a point-spread range. They also assessed their own probability of being right. When more information about the game was provided, participants updated their predictions and self-assessments. Five blocks of information were eventually given for each game and each participant predicted 15 games. The results show that prediction accuracy did not improve as more blocks of information were given. There was an accuracy of 64 percent with only one block of information and that increased to only 66 percent with all five blocks of information. On the other hand, confidence started at 69 percent and increased to 79 percent with all the information. In another experiment, these

researchers ordered the quality of information blocks. Some participants saw the quality of information improve with the revelation of each new block, while the other participants started with the best information and then saw blocks that became less valuable. The results are the same: people became more confident as they received more information, even though the accuracy of their predictions did not improve.

Using the Internet, investors have access to vast quantities of information. This information includes historical data such as past prices, returns, and firm operational performance as well as current information such as real-time news, prices, and volume. However, most individual investors lack the training and experience of professional investors and therefore are less sure of how to interpret the information. That is, this information does not give them as much knowledge about the situation as they think because they do not have the training to interpret it properly. This is the difference between knowledge and wisdom.

A good example is to illustrate the kind of information investors might use to make decisions. Consider the distinction between unfiltered information and filtered information. The unfiltered information comes directly from the source, like company financial statements. This information can be difficult to understand because it is riddled with jargon and complicated accounting rules. Filtered information is unfiltered data that is interpreted and packaged by professionals for general investor consumption, such as information from analysts or services like Value Line. It is easy and cheap for novice investors to collect unfiltered information. Yet it is likely that these inexperienced investors may be fooled by the illusion of knowledge and make poor decisions because of their failure to properly understand the unfiltered information. They would be better off using filtered information until they gain more experience. One financial study examined the types of information, experience, and portfolio returns of investors.[14] The study confirmed that lower returns occur for less-experienced investors when they rely more on unfiltered information. Relying on filtered information improved returns for these investors. More experienced investors can achieve higher returns using unfiltered information. Presumably, experience helps them turn knowledge into wisdom.

Many individual investors realize they have a limited ability to interpret investment information, so they use the Internet for help. Investors can get analyst recommendations, subscribe to expert services, join newsgroups, and learn others' opinions through chat rooms and Web postings. However, online investors need to take what they see in these chat rooms with a grain of salt. Not all recommendations are from experts.

The evolution of the use of online brokers is interesting. The original pitch for online brokers was that sophisticated individual investors do not need the advice of full-service brokers and should thus not pay the expensive trading commissions. That concept has evolved to modern trading platforms like Robinhood, which markets to younger investors with less experience. Investor chat-room recommendations, such as on Reddit's WallStreetBets, are not likely to be from experts—when they are, they are trying to manipulate investors into buying stocks the expert already owns to create upward price

pressure. A study examined the stocks recommended by people who posted messages on the boards of two Internet newsgroups.[15] Most of the stocks recommended had recently performed very well or very poorly. The stocks with very good performance the previous month were recommended as a purchase (momentum strategy). These stocks subsequently underperformed the market by more than 19 percent the next month. The stocks with extremely poor performance during the previous month that were recommended for purchase (value strategy) outperformed the market by more than 25 percent over the following month. Overall, the stocks recommended for purchase did not perform significantly better or worse than the market in general.

Another study finds that positive message-board postings at RagingBull.com are not associated with positive stock returns the following day or week.[16] However, unusually high numbers of postings are associated with higher trading volume. These studies conclude that message-board stock recommendations do not contain valuable information for investors. However, if investors perceive the messages as having increased their knowledge, they might be overconfident about their investment decisions. The higher trading volume indicates that this might be the case.

Who Is Overconfident? We often think of two kinds of investors in the stock market: individual investors and institutional investors.

Which type is more prone to overconfidence? Two scholars, Chuang and Susmel, compare the trading activity of both types of investors on the Taiwanese stock market.[17] They specifically look at market conditions that foster overconfident trading, such as after the gains of a bull market or after large gains in individual stocks.

While both individual and institutional investors exhibit higher trading activities during these likely overconfident periods, the effect is greater for individual investors. Also, while trading more during these periods of likely overconfidence, individual investors also shift to more risky stocks. The combination of both higher trading and greater risk-taking by individuals after market gains suggests that they are prone to overconfidence. Not only do individual investors trade more aggressively after market gains, but their performance gets worse than the institutional investors.

Illusion of Control

Another important psychological factor is the illusion of control. People often believe they have influence over the outcome of uncontrollable events. The key attributes that foster the illusion of control are choice, outcome sequence, task familiarity, information, and active involvement.[18] Online investors routinely experience these attributes.

Choice Making an active choice induces control. For example, people who choose their own lottery numbers believe they have a better chance of winning than people

who have numbers given to them at random. Because online brokers do not provide advice to investors, investors must make their own choices regarding what (and when) to buy and sell.

Outcome Sequence The way in which an outcome occurs affects the illusion of control. Early positive outcomes give the person a greater illusion of control than early negative outcomes do. Investors were getting on the Web during the late 1990s and taking control of their investments, and, because this period was an extended bull market interval, they were likely to have experienced many positive outcomes.

Task Familiarity The more familiar people are with a task, the more they feel in control of the task. As discussed later in this chapter, investors have been becoming familiar with the online investment environment and have been active traders and participants in Web information services.

Information When a greater amount of information is obtained, the illusion of control is greater as well. The vast amount of information on the Internet already has been illustrated.

Active Involvement When a person participates a great deal in a task, the feeling of being in control is also proportionately greater. Online investors have high participation rates in the investment process. Investors using discount brokers (such as online brokers) must devise their own investment decision-making process. These investors obtain and evaluate information, make trading decisions, and place the trades.

The Internet fosters further active involvement by providing the medium for investment chat rooms, message boards, and newsgroups. Internet investment services such as Yahoo!, Motley Fool, Silicon Investor, and The Raging Bull sponsor message boards on their websites where investors can communicate with each other. Typically, message boards are available for each stock listed on the exchange. Users post a message about a firm using an alias or simply read the message postings.

Past Successes Overconfidence is learned through past success. If a decision turns out to be good, then it is attributed to skill and ability. If a decision turns out to be bad, then it is attributed to bad luck. The more successes people experience, the more they will attribute it to their own ability, even when much luck is involved.

During bull markets, individual investors will attribute too much of their success to their own abilities, which makes them overconfident. As a consequence, overconfident behaviors (e.g., high levels of trading and risk-taking) will be more pronounced in bull markets than in bear markets.[19]

This is borne out in the behavior of investors during the bull market of the late 1990s and the subsequent bear market. As the bull market raged on, individual investors

traded more than ever. In addition, investors allocated higher proportions of their assets to stocks, invested in riskier companies, and even leveraged their positions by using more margin (borrowed money).[20] These behaviors slowly became reversed as the overconfidence of the people investing in the bull market faded and the bear market dragged on.

Overconfidence appears to persist for a while after negative trading outcomes. One experiment uses a trading game in which participants earn real money trading commodities.[21] Before the trading session, they were asked a common question that reveals their level of confidence: "Based upon your own judgment, what is the probability (in %) that your performance will exceed the median performance (top 50%) of all those who participated in the experiment today? ____%." Note that neutral participants would indicate a 50 percent probability of being in the top half. Confident people estimate a much higher chance of being in the top half. After the trading session, they were asked for a probability that their performance actually achieved a top half ranking. Interestingly, the participants labelled as overconfident from the pre-session question also showed overconfidence in the post-session estimate—*regardless* of how they actually performed. The participants returned for a second session. Again, overconfidence persisted from the first pre-session confidence estimate to the pre-session estimate of the second trading session, which was not dependent on how they actually performed. Thus, it may take several poor performances before overconfidence diminishes.

Online Trading

Brad Barber and Terry Odean investigated the trading behavior of 1,607 investors who switched from a phone-based trading system to an Internet-based trading system at a discount brokerage firm.[22] In the two years prior to the time investors went online, the average portfolio turnover was about 70 percent. After going online, the trading of these investors immediately jumped to a turnover of 120 percent. Some of this increase is transitory; however, the turnover rate of these investors was still 90 percent two years after going online.

A different study investigated the effect of Web-based trading in 401(k) pension plans.[23] A total of 100,000 plan participants from two companies were given the opportunity to trade their 401(k) assets using an Internet service. The advantage of studying these trades is that because they occurred within a qualified pension plan, liquidity needs and tax-loss selling were not factors. All trades can be considered speculative. Their conclusions were consistent with overconfident trading; specifically, they found that trading frequency doubled and portfolio turnover increased by 50 percent.

Online Trading and Performance Barber and Odean also examined the performance of the investors before and after going online. Before switching to the online trading

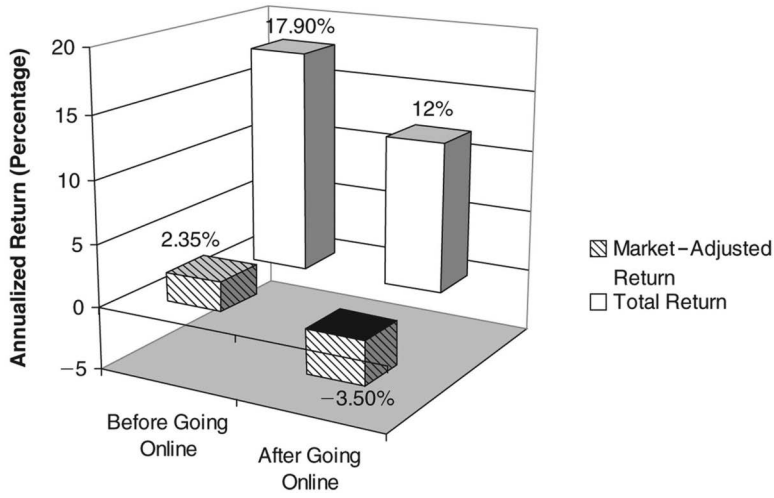

FIGURE 2.3 Annualized Market-Adjusted Return and Total Return of Investors Before and After Switching to an Online Trading System

service, these investors were successful. As illustrated in Figure 2.3, they earned nearly 18 percent per year before going online. This represents a return of 2.35 percent more than the stock market in general. However, after going online, these investors experienced reduced returns. They averaged annual returns of only 12 percent, underperforming the market by 3.5 percent.

The successful performance of these investors before going online might have fostered overconfidence due to the illusion of control (via the outcome sequence). This overconfidence might have caused them to choose an Internet trading service. Unfortunately, the Internet trading environment exacerbates the overconfidence problem, inducing excessive trading. Ultimately, investor returns are reduced.

Recently, Professor Brad Barber and colleagues examined the trading activity and performance of Robinhood investors.[24] Robinhood was the first brokerage to offer commission-free trading on an engaging mobile app. The term "engaging" might even be an understatement. Many describe the design as a gamification of the trading process. Robinhood's customers tend to be inexperienced investors, as half had never invested before joining the trading platform. The paper reports that the average Robinhood investor trades a lot and is attracted to stocks getting a lot of attention. That is, they seem to mistake attention, which involves hearing the same small amount of information over and over again, for obtaining quality information or even wisdom. As a result, Robinhood investors tend to herd in the same stocks—35% of net buying by Robinhood customers is concentrated in ten stocks. The stocks they herd into the most tend to underperform the market over the following month. In short, most Robinhood investors lack long-term experience, trade up to nine times more than users of other discount brokers, like E-Trade and Schwab, and do not earn positive abnormal returns. Thus, their trading actions show overconfidence.

Summary

People can be overconfident about their abilities, knowledge, and future prospects. Overconfidence leads to excessive trading, which lowers portfolio returns. Lower returns result from the commission costs associated with high levels of trading and the propensity to purchase stocks that underperform the stocks that are sold. Overconfidence also leads to greater risk-taking due to underdiversification and a focus on investing in small companies with higher betas. Individual investors are most likely to get overconfident after experiencing high returns, such as after a strong bull market. Finally, the trend of using online brokerage accounts is making investors more overconfident than ever before.

Questions

1. Would you expect investors to be more overconfident in the midst of a bull market or a bear market? Why?
2. How might an investor's portfolio have changed from 1995 to 2000 if the investor had become overconfident? Give examples of the numbers and types of stocks in the portfolio.
3. How does the Internet trick investors into believing they have wisdom?
4. How might using an online broker (versus a full-service broker) create an illusion of control?

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CHAPTER

3 Pride and Regret

People avoid actions that create regret and seek actions that cause pride. Regret is the emotional pain that comes with realizing that a previous decision turned out to be a bad one. Pride is the emotional joy of realizing that a decision turned out well.

Consider the following example of the state lottery.[1] You have been selecting the same lottery ticket numbers every week for months. Not surprisingly, you have not won. A friend suggests a different set of numbers. Will you change your numbers?

Clearly, the likelihood of the old set of numbers winning is the same as the likelihood of the new set of numbers winning. This example has two possible sources of regret. Regret will result if you stick with the old numbers and the new numbers win. This is called the regret of omission (not acting). Regret also will result if you switch to the new numbers and the old numbers win. The regret of an action you took is the regret of commission. In which case would the pain of regret be stronger? The stronger regret would most likely result from switching to the new numbers because you have invested a lot of emotional capital in the old numbers—after all, you have been selecting them for months. Generally, a regret of commission is more painful than a regret of omission. Investors often regret the actions they take, but seldom regret the ones they do not.

Disposition Effect

Avoiding regret and seeking pride affects people's behavior, but how does it affect investment decisions? Two financial economists, Hersh Shefrin and Meir Statman, studied this psychological behavior of investors making decisions.[2] They showed that fearing regret and seeking pride causes investors to be predisposed to selling winners too early and riding losers too long. They call this the *disposition effect*.

Consider the situation in which you wish to invest in a particular stock. However, you have no cash and must sell another stock in order to have the cash for the new purchase.

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You can sell either of two stocks you hold. Stock A has earned a 20 percent return since you purchased it, whereas stock B has lost 20 percent. Which stock do you sell? Selling stock A validates your good decision to purchase it in the first place. It would make you feel proud to lock in your profit. Selling stock B at a loss means realizing that your decision to purchase it was bad. You would feel the pain of regret. The disposition effect predicts that you will sell the winner, stock A. Selling stock A triggers the feeling of pride and allows you to avoid regret.

Disposition Effect and Wealth

Why is it a problem that investors may sell their winners more frequently than their losers? One reason relates to the U.S.'s tax code. The taxation of capital gains causes the selling of losers to be a wealth-maximizing strategy. Selling a winner leads to the realization of a capital gain and, hence, payment of taxes. Those taxes reduce your profit. On the other hand, selling the losers gives you a chance to reduce your taxes, thus decreasing the amount of the loss. Reconsider the previously mentioned example and assume that capital gains are taxed at the rate of 15 percent (Table 3.1). If your positions in stocks A and B are each valued at $1,000, then the original purchase price of stock A must have been $833, and the purchase price of stock B must have been $1,250.

If you sell stock A, you receive $1,000 but you pay taxes of $26.55, so your net proceeds are $973.45. Alternatively, you could sell stock B and receive $1,000 plus gain a tax credit of $37.50 to be used against other capital gains, so your net proceeds are $1,037.50. If the tax rate is higher than 15 percent (as in the case of gains realized within one year of the stock purchase), then the advantage of selling the loser is even greater. Interestingly, the disposition effect predicts the selling of winners even though selling the losers is a wealth-maximizing strategy.

Tests of Avoiding Regret and Seeking Pride

Do investors behave in a rational manner by predominantly selling losers, or are investors affected by their psychology and have a tendency to sell their winners? Several studies provide evidence that investors behave in a manner more consistent with the

TABLE 3.1 Capital Gains and Taxation

Sell	Stock A (in $)	Stock B (in $)
Sale Proceeds	1,000	1,000
Tax Basis	833	1,250
Taxable Gain (Loss)	177	(250)
Tax (Credit) at 15%	26.55	(37.50)
After-Tax Proceeds	973.45	1,037.50

disposition effect (selling winners). These studies generally fall into two categories: studies that examine the stock market and those that examine investor trades.

For example, Ferris et al.[3] examined the trading volume of stocks following price changes. If investors trade to maximize wealth, then they should sell stocks with price declines and capture the tax benefits. In addition, they should refrain from selling stocks with price gains to avoid paying taxes. Therefore, the volume of trades should be high for stocks with losses and low for stocks with gains. Alternatively, investors may opt to avoid regret and seek pride. In this case, it would be expected that investors will hold their losers and sell their winners. Therefore, high volume in the stocks with gains and low volume in the stocks with declines is consistent with the disposition effect.

Ferris et al. used a methodology that determined the normal level of volume expected for each stock. They reported results that could be interpreted as a form of abnormal volume; that is, a negative abnormal volume indicates less trading than normal, whereas a positive abnormal volume indicates more trading than normal. Using the 30 smallest stocks on the New York Stock Exchange (NYSE) and the American Stock Exchange over a three-year period, they grouped each stock into categories based on the percentage gain or loss at each point in time. The results are presented in Figure 3.1.

Note that the stocks with losses of more than 22.5 percent are grouped in the left column. The loss diminishes in each column to the right until the middle of the graph, where stocks had small losses or gains. Stocks in the far-right column had a gain of more than 22.5 percent. In general, stocks with gains had positive abnormal volume, whereas stocks with declines had negative abnormal volume. Higher volume in stocks with gains and lower volume in stocks with declines is consistent with the disposition effect.

This analysis was performed separately for stock volume in December and the rest of the year because people are more aware of the benefits of selling losers and gaining tax advantages in December. Therefore, it would seem that investors might be more likely to enact a wealth-maximizing strategy in December versus the other months. However,

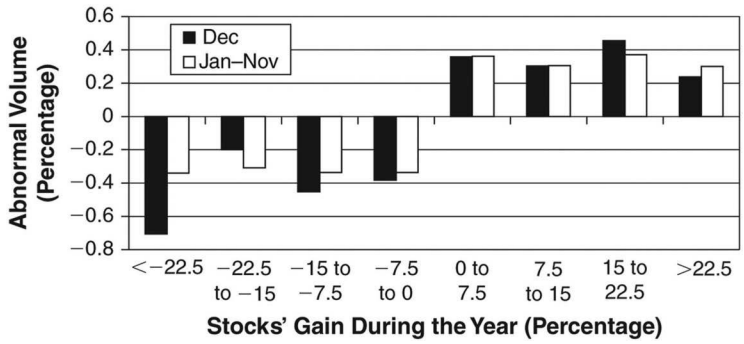

FIGURE 3.1 Volume of Stocks After Losses and Gains

Figure 3.1 shows that investors avoid regret and seek pride as much in December as during the rest of the year.

Nevertheless, some people do tax-loss selling at the end of the year. Is it possible that tax awareness might inhibit the disposition effect? Professor William Bazley and his colleagues conducted tests to find out.[4] They set up an experiment in which stocks were bought and sold. All participants faced the same tax implications when trading stocks and were informed of the presence of capital gains taxes during the initial instructions. However, the treatment group (high tax salience group) received a notice indicating the tax implication for each trade, whereas the control group did not. The results were that investors displayed the disposition effect behavior, but the high tax salience group reduced the disposition effect by 22 percent to 47 percent compared to the control group. Both sides of the disposition effect were affected. The high tax salience group held winners longer and sold losers sooner. Consequently, the high tax salience group had better trading performance. Being tax aware helps investors to mitigate the disposition effect.

Other studies have analyzed the actual trades and portfolios of individual investors. In an older study using trades from a national brokerage house from 1964 to 1970, Schlarbaum et al. examined 75,000 round-trip trades.[5] A round-trip trade is a stock purchase followed later by the sale of the stock. They examined the length of time the stock was held and the return that was received. Are investors quick to close out a position when it has taken a loss or when it has had a gain? Consider the behavior implied by the disposition effect. If you buy a stock that goes up quickly, you will be more inclined to sell it quickly. If you buy a stock that goes down or remains level, you are more inclined to hold while waiting for it to go up. Therefore, stocks held for a short time tend to be winners, and stocks held longer are likely to be less successful. Figure 3.2 shows the average annualized return for a position held for less than one month, 1–6 months, 6–12 months, and more than one year. The figure illustrates that investors are quick to realize their gains. The average annualized return for stocks purchased then sold within one month was 45 percent. The returns for stocks held for

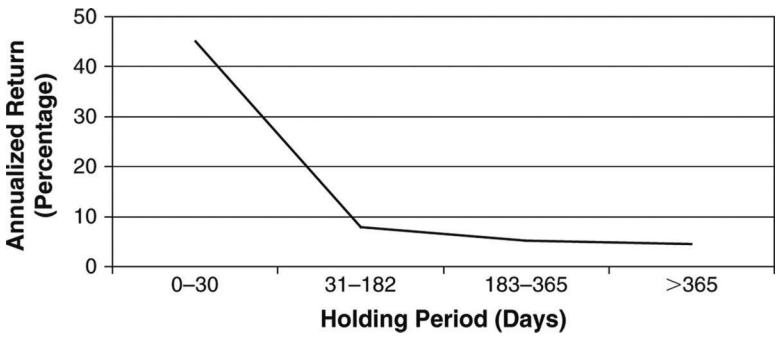

FIGURE 3.2 Annualized Return for Different Investor Holding Periods

1–6 months, 6–12 months, and more than one year were 7.8 percent, 5.1 percent, and 4.5 percent, respectively. It appears that investors are quick to sell winners.

Terrance Odean also studied the trades of 10,000 trading accounts from a nationwide discount brokerage over a six-year period.[6] At each sell trade, Odean calculated the amount of gains and losses the investor had on paper in his or her portfolio. If the investor sold a winner, then Odean calculated the gain on the stock and divided the value by the total paper gains available to the investor. The result is the proportion of total gains that the investor realized with the sell trade. If the stock sold was a loser, then the proportion of total losses realized was computed.

Odean found that when investors sell winners, the sale represents 23 percent of the total gains of the investors' portfolio. Alternatively, when a loser is sold, it represents only 15.5 percent of the unrealized losses in the portfolio. On average, investors are 50 percent more likely to sell a winner than a loser. However, the propensity to sell a stock seems to be greater for stocks with higher profits. In other words, investors can achieve more pride when the profit realized is larger. But this does not appear to be the case for selling losers.[7] Investors are reluctant to sell a loser. That reluctance is no greater for big losers than it is for small losers. Regret seems to be measured as a loss. However, the magnitude of the loss does not seem to play much of a role in avoiding the regret.

International Tests of the Disposition Effect Researchers have found the disposition effect to be pervasive. Investors in Finland, Israel, and China exhibit the behavior. Mark Grinblatt and Matti Keloharju studied all investor trades in Finland during 1995 and 1996.[8] They found that a large positive return the previous week significantly increased an investor's propensity to sell the stock. On the other hand, a large decrease in price significantly increased the probability that the investor will hold the stock. They also found that the more recently the stock gains or losses occurred (last week versus last month), the stronger the propensity was to sell winners and hold losers. Interestingly, they also found that financial institutions succumb to the disposition effect nearly as much as individual investors do, although institutions are more likely to sell their losers than other investors. Among investors in Israel, Zur Shapira and Itzhak Venezia found that individual investors held on to winner stocks for an average of 20 days and loser stocks for 43 days.[9] Investors hold losers twice as long as winners! Chinese investors also realize more gains than losses and hold losers ten days longer than winners.[10]

Disposition Outside the Stock Market Most of the evidence for the disposition effect has been found in the various stock markets around the world. How much of an impact does avoiding regret and seeking pride have in other markets? Several studies have found that futures traders (trading in agricultural, bond, currency, and stock index futures contracts) hold on to losses significantly longer than gains, and traders who hold on to positions longer make less profit.[11] Corporate managers with employee stock options exhibit a disposition effect in their willingness to exercise those options.[12] In the

real estate market, homeowners are reluctant to sell their homes below their original purchase price.[13]

One area in which investors do not seem to exhibit the disposition effect is in mutual fund share ownership. Several studies found that investors are more willing to sell shares in a losing mutual fund and reluctant to sell winner funds.[14] This behavior is the opposite of loss aversion and the disposition effect. In fact, it is called a reverse disposition effect pattern. One author team explains that the key is the ability to blame others.[15] The pain of regret can be mitigated if someone else can be blamed for the loss. Consider the variation in the amount of delegation used in different asset vehicles. For example, the investors pick stocks—no delegation. However, that actively managed mutual fund has a portfolio manager. This is a high degree of delegation for the investment return. What about an index fund? It has a manager, but the fund simply follows an index. The level of delegation for an index fund is likely to be somewhere between picking stocks and picking an actively managed mutual fund. The scholars examine the disposition effect pattern in stock trades, index fund trades, and actively managed mutual fund trades. They find that the degree of disposition trading is correlated to the degree of delegation. Stock trades exhibit disposition, index fund trades do not, and actively managed mutual fund trades show reverse disposition. Thus, investors are not as reluctant to realize a loss if they can blame someone else for the problem. If an investor can blame the portfolio manager or a financial advisor, then the investor feels less regret. They argue that this behavior is rooted in resolving cognitive dissonance—a topic discussed in the next chapter.

Selling Winners Too Soon and Holding Losers Too Long

The disposition effect not only predicts the selling of winners but also suggests that the winners are sold too soon and the losers are held too long. What does selling too soon or holding too long imply for investors? 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 will continue to perform poorly.

When an investor sold a winning stock, Odean found that the stock generally beat the market during the next year by an average 2.35 percent.[16] During this same year, the loser stocks that the investors kept generally underperformed the market by −1.06 percent. Investors tend to sell the stock that ends up providing a high return and keep the stock that provides a low return.

Note that the fear of regret and the seeking of pride hurt investors' wealth in two ways. First, investors are paying more in taxes because of the disposition to sell winners instead of losers. Second, investors earn a lower return on their portfolio because they sell the winners too early and hold poorly performing stocks that continue to perform poorly.

Martin Weber and Colin Camerer designed a stock trading experiment for their students.[17] They created six "stocks" for trading and showed the students the last three

price points of each stock. They designed the experiment so that the stock prices are likely to trend; that is, stocks with gains will likely continue to gain, whereas stocks with declines will likely continue to decline. The students are shown the potential prices for each stock in the future. Because of this experimental design, stocks with losses should be sold and stocks with gains should be held (the opposite of the disposition effect). Contrary to the wealth-maximizing strategy, the student subjects sold fewer shares when the price was below the purchase price than when the price was above, thus exhibiting the disposition effect.

Disposition Effect and News

One study investigated all the trades of individual investors in 144 NYSE firms during the period of November 1990 through January 1991.[18] Specifically, the study investigated how investors reacted to news about the firms and news about the economy. News about a company primarily affects the price of the company's stock, whereas economic news affects all firms. Good news about a firm that increases the firm's stock price induces investors to sell (selling winners). Bad news about a firm does not induce investors to sell (holding losers). This is consistent with avoiding regret and seeking pride.

However, news about the economy does not induce investor trading. Although good economic news increases stock prices and bad economic news lowers stock prices, this does not cause individual investors to sell. In fact, investors are less likely than usual to sell winners after good economic news. These results are not consistent with the disposition effect.

This illustrates an interesting characteristic of regret. When taking a stock loss, investors feel stronger regret if the loss can be tied to their own decisions. However, if investors can attribute the loss to reasons that are out of their control, then the feeling of regret is weaker.[19] For example, if the stock you hold declines in price when the stock market itself is advancing, then you have made a bad choice, and regret is strong. However, if the stock you hold declines in price during a general market decline, then this is essentially out of your control, so the feeling of regret is weak.

Investor actions are consistent with the disposition effect for company news because the feeling of regret is strong. In the case of economic news, investors have a weaker feeling of regret because the outcome is considered beyond their control. This leads to actions that are not consistent with the predictions of the disposition effect.

Reference Points

The pleasure of achieving gains and the pain of losses is a powerful motivator of human behavior. However, it might be difficult to determine whether some investment

transactions are considered a profit or a loss. For example, Bob purchases a stock for $50 per share. At the end of the year, the stock is trading for $100. Also, at the end of the year, Bob re-examines his investment positions in order to record and determine his net worth and monitor the progress he has made toward his financial goals. Six months later, Bob sells the stock for $75 per share. He has made a profit of $25 per share. However, the profit is $25 per share lower than if he had sold at the end of the year. Clearly, he made a $25-per-share profit. However, does Bob feel as if he made a profit, or does he feel as if he lost money?

This issue deals with a *reference point*. A reference point is the stock price that we compare with the current stock price. The current stock price is $75. Is the reference point the purchase price of $50 or the end-of-year price of $100? The brain's choice of a reference point is important because it determines whether we feel the pleasure of obtaining a profit or the pain of a loss.

An interesting example of whether reference points matter is the case of the initial public offering (IPO). Markku Kaustia examined the volume in IPO trading between stocks that trade above their offer price versus those that trade below their offer price.[20] For a stock to trade, there must be someone who is willing to sell. The disposition effect suggests that investors are more willing to sell when the stock is a winner and are reluctant to sell when it is a loser. Thus, volume should be higher for IPOs trading above their offer price because they are winners when disposition impacts these investors. He finds that volume is lower for IPOs selling below their offer price as investors are reluctant to sell the newly purchased stock at a loss. Volume is higher for IPOs trading above the offer price. Those investors seem to be more willing to realize a quick profit by selling. In fact, the higher the gain of the stock, the higher the ensuing trading volume.

The early investigations into the psychology of investors assumed that the purchase price was the reference point. This makes IPOs a great test because the purchase price is known for most of the investors selling the stock on the first day. However, investors monitor and remember their investment performance over the period of a year. If the purchase was made long ago, then investors tend to use a more recently determined reference point.

What recent stock price is used as a reference? When thinking about the stock market in general, investors use indexes to gain the performance of stocks. One of the most widely reported indices is, of course, the Dow Jones Industrial Average. Investors tend to use the Dow's all-time high and the 52-week high as important reference points.[21]

Regarding individual stocks, an interesting investigation of the exercising of stock options illustrates a reference point.[22] Stock options have a premium value in addition to the fundamental value derived from the difference between the option's strike price and the underlying stock price. In other words, even out-of-the-money options have a positive value. The premium declines to zero on the option's expiration date. Because of this premium, it is almost never optimal to exercise an option before the expiration

date. If a trader wants to lock in a profit, then selling the option results in more value than exercising it and receiving the stock shares. Yet, Allen Poteshman and Vitaly Serbin found a large number of early option exercises of exchange traded stock options, which often occurred months before the expiration date. What would motivate these investors to choose this irrational behavior?

They found that a trigger occurs when the underlying stock price reaches or exceeds its 52-week high. This suggests that the recent highest price is an important reference point for investors. In fact, it is such a strong focus for the option traders that when the stock price climbs above this reference, traders rush to lock in profits. Some of them even irrationally exercise the options. It appears that this problem can be avoided though. Customers of discount brokers execute these irrational trades more than customers of full-service brokers. The professional traders did not make this mistake.

Reference Point Adaptation In the opening illustration of this section, would Bob consider the purchase price of $50 to be his reference point, or the recent year-end price of $100, or something else? In other words, do investors adapt their reference points over time?

Yes, it appears that investors would adapt their reference point over time. How they adapt it is similar to the disposition effect. Consider the shape of prospect theory's utility function shown in Chapter 1. After Bob's stock has earned a $50 profit, he feels good about it. Investors tend to sell the stock and lock in that happiness. It seems that investors can lock in some of that happiness by holding on to the stocks and simply shifting their reference point. A research paper that examines this possibility surveys people and asks them about how much prices must go up a second time in order to feel as good as the first profit.[23] By comparing the answers to the prospect theory utility function, the authors can determine how much the investors have moved the reference point after the initial stock price increase. A similar analysis is done for stock declines and losses.

The results of the study are consistent with prospect theory. Because of the shape of the utility function, investors would be happier if they experienced two separate $50 profits rather than one $100 profit. This is one way to explain the disposition effect. Investors sell their winners quickly in order to feel the happiness and set themselves up for another profit in another trade. It now appears that investors can get the same effect by changing the reference point after the profit and then considering the holding of the stock to be a new trade. Also consider the sadness we feel after a loss. Investors try to minimize the regret by holding the loser and not locking in the negative emotion. How would that impact reference point adaptation? Investors would not want to implicitly lock in the sadness by shifting the reference point like they do for winners. This is exactly what the research shows. People increase their reference points on stocks they hold more for winners than for losers. Returning to the illustration with Bob, he probably feels as if he lost money because he would have moved his reference point to $100 when he recorded that price in his end-of-year evaluation.

However, there is also evidence that investors fail to properly adjust their reference point. Consider a 2-for-1 stock split. This split causes investors to own double the number of shares they held before, but the price falls by half. Thus, investors own the same dollar value of the stock. When Bob's $75 stock executes a 2-for-1 split, it is repriced to $37.50. Bob should mentally adjust the $50 purchase price to $25, and the end-of-year $100 to $50. However, the split appears to muddle the reference points enough that it reduces the magnitude of regret. Indeed, the disposition effect disappears for stocks that have recently split.[24]

Can the Disposition Effect Impact the Market?

Professors Vijay Singal and Zhaojin Xu examined the portfolios and trading of mutual funds.[25] They found that 30 percent of mutual funds exhibit the disposition effect. These disposition funds underperform the other funds by 4–6 percent per year and are more likely to be closed. Can the presence of a large group of investors suffering from the disposition effect impact market prices? Andrea Frazzini provided evidence that it does.[26] Consider a stock that has risen in price and has many investors who hold capital gains in it. If this firm announces good news (like a great earnings report), the selling of this winner will temporarily depress the stock price from fully rising to its deserved new level. From this lower price base, subsequent returns will be higher. This price pattern is known as an "underreaction" to news and a post-announcement price drift. Frazzini showed that the post-announcement drift occurs primarily in winner stocks where investors have unrealized capital gains and loser stocks with unrealized capital losses.

Frazzini first analyzed mutual fund holding data and found that they also displayed the disposition effect. In fact, the managers of funds that performed the worst were the most reluctant to close their losing positions. To estimate the amount of unrealized capital gains (or losses) in each stock, an average cost basis of the mutual funds was computed. This basis was used as the reference point in comparison to current prices. Many investors consider stocks with current prices higher than the reference point as winner stocks with unrealized capital gains. The largest positive post-announcement drift occurs for stocks with good news and large unrealized capital gains. The largest negative drift occurs for stocks with bad news and large unrealized capital losses. This pattern is consistent with disposition investors quickly selling winners, preventing the stock price from initially rising to its new level. Disposition investors are also reluctant to sell losers, thus underreacting to negative news about these firms.

Disposition and Investor Sophistication

Does loss aversion and the disposition effect impact all investors? Can we learn to avoid it? It is hoped that once we learn about a behavioral bias, we become more investment savvy and can avoid that problem. Indeed, it appears that more sophisticated investors exhibit lower levels of loss aversion and the disposition effect than less sophisticated

investors. For example, investors with higher incomes exhibit lower disposition than those with lower incomes. There is lower disposition for investors with a professional occupation versus a non-professional job.[27]

Do professional investors exhibit the disposition effect? In general, the answer is yes. As described earlier, professional futures traders, mutual fund managers, and other money managers tend to realize gains at a faster rate than realizing losses. Is it because losing positions are more likely to do better in the future than profitable positions, or do the managers have a sunk emotional cost associated with these positions? Li Jin and Anna Scherbina seem to think it is the latter.[28] They studied the changes made in mutual fund portfolios when a new portfolio manager takes over. They find that the new manager, who has no regret aversion to these inherited positions, sells these underperforming positions more than other mutual funds and more than the highly performing positions.

Buying Back Stock Previously Sold

One investor behavior that seems odd from the perspective of traditional finance is the fact that investors tend to sell a stock and then repurchase it again later. In fact, investors often buy and sell the same stock many times. Regret plays a role in whether an investor will repurchase a stock. Investors who are happy with the outcome of a completed trade want to relive that happiness and do so by repurchasing the same stock. An unhappy feeling with a trade is not to be relived—it is to be avoided. So, stocks that bring back regret are not repurchased.

Terry Odean teamed up with Brad Barber and Michal Ann Strahilevitz to explain this behavior.[29] They illustrate how emotion is induced after the sale of a stock. As Figure 3.3 shows, there are two factors that influence the emotion created from a stock sale—the profit of the trade and the movement of the price after the sale. When investors sell a stock at a loss, the negative emotion of regret is painful enough so that there is no desire to repurchase the stock. Once burned, twice shy. You might think that selling a winner creates a positive emotion. While that is true, the emotion is short-lived and is impacted by how the stock's price changes after the sale. If the price continues to go up, then the

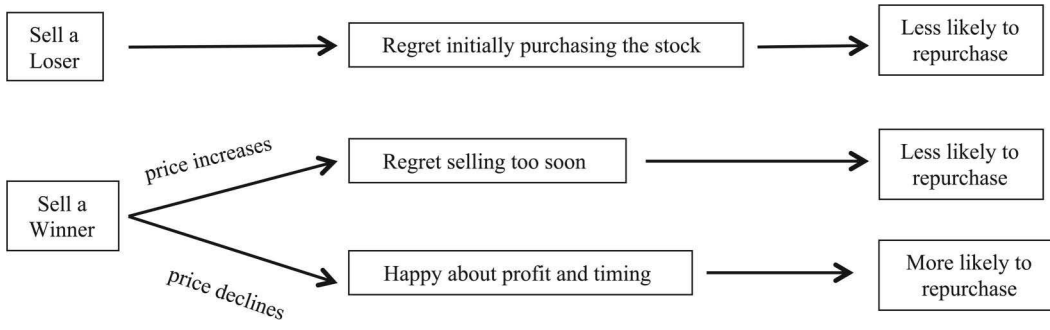

FIGURE 3.3 The Dynamics of Repurchasing a Stock Previously Sold

happiness starts to change to regret as the investor wishes he had not sold it so soon. Between the initial happiness and the later regret, it is the negative emotion that lasts. So no repurchase occurs. However, when a winner stock is sold and the price subsequently falls, the investor feels doubly happy due to the profit and the great timing of the sale. Investors are more likely to repurchase this winner stock that later declined.

Studying actual trades of investors during an eight-year period, the authors find that the frequency of repurchasing a stock previously sold is consistent with the emotion experienced in the previous trade. They find that investors repurchase a stock three times more frequently if it was a winner and the price falls after the sale compared to if it was a loser. Indeed, once burned, twice shy. Abhishek Varma and I show that repurchase is a fairly pervasive behavior, with about 40 percent of investing households making at least one repurchase.[30] We also show that the repurchase of the former winner stock is most likely to occur if it was the most recent one sold. People tend to more easily recall the most recent events. Thus, the most recent stock sale is the most salient and on the investor's mind. Finally, we show that this behavior is sub-optimal and that more sophisticated investors are less likely to engage in it.

Summary

People act (or fail to act) to avoid regret and seek pride, which causes investors to sell their winners too soon and hold their losers too long—the disposition effect. This behavior hurts investor wealth in two ways. First, investors pay more capital gains taxes because they sell winners. Second, investors earn a lower return because the winners they sell no longer continue to perform well, while the losers they still hold continue to perform poorly. The disposition effect can be seen in investor trades, market volume, and other markets such as real estate and derivatives trading. A common rule of thumb to avoid letting the disposition effect impact you is to "cut your losses and let your profits run."

Experiencing regret also causes investors to be less likely to repurchase the same loser stock later. However, investors do like to relive the good experience of selling a winner and watching a subsequent decline in the stock's price.

Questions

1. Consider an investor's statement: "If the stock price would only get back up to what I paid for it, I'd sell it!" Describe how the biases in this chapter are influencing the investor's decision.
2. How would the number of stocks held in the portfolio impact the disposition effect?
3. How can succumbing to the disposition effect harm wealth?
4. How can the disposition effect impact market prices?
5. Investors frequently repurchase a stock they previously owned and sold. Explain which stocks they are more likely to repurchase.

Notes

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