

SIXTH EDITION

THE PSYCHOLOGY OF INVESTING



JOHN R. NOFSINGER



The Psychology of Investing

While traditional finance focuses on the tools used to optimize return and minimize risk, this book explains how psychology can affect our decisions more than financial theory. Covering the ways investors actually behave, 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 sixth 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 exhibit real-life investors making choices that hurt their wealth.
- A new chapter on the biology of investment, exploring the latest research on genetics, neuroscience, and how hormones, aging, and nature versus nurture inform our investment behavior.
- An additional strategy for controlling biases, helping readers understand the psychology that motivates markets and how to address it.
- Experiential examples, chapter summaries, and end-of-chapter discussion questions to help readers test their practical understanding.

Fully updated with the latest research in the field, *The Psychology of Investing* will prove fascinating and educational for advanced students in investment, portfolio management, and behavioral finance classes as well as investors and financial planners. An updated companion website includes an instructor's manual, PowerPoint slides, and more.

John R. Nofsinger is the William H. Seward Endowed Chair in International Finance and Professor of Finance at the University of Alaska Anchorage, USA.

“Nofsinger does an incredible job explaining why we sometimes make poor investing decisions. Read this book and save your wallet from self-inflicted pain and anguish!”

Wesley R. Gray, *CEO, Alpha Architect, USA*

“Each new edition of *The Psychology of Investing* offers added breadth and depth on this fascinating subject. Investors who lack awareness about the psychological aspects of finance can be their own worst enemies. Nofsinger’s current update of this highly insightful book is a must-read for all investors interested in improving their chances of achieving success in the market.”

H. Kent Baker, *American University, USA*

The Psychology of Investing

Sixth 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 greed dominated during the tech bubble of the late 1990s and fear ruled behavior in the financial crisis of 2008. 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. This sixth edition of *The Psychology of Investing* has a new first-of-its-kind chapter that describes the physiology of investing. The new chapter is about nature versus nurture. How

much of our risk tolerances come from our experiences and how much comes from our genetics, hormones, and aging? It is a very interesting new line of research and with the mapping of the human genome, there is likely to be much more biology and investing scholarship coming.

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

- Updated to include a discussion of the new physiology chapter

Chapter 2: Overconfidence

- Added a subsection on who is overconfident

Chapter 3: Pride and Regret

- Added a discussion on how the disposition effect is related to investment delegation
- Expanded the discussion of buying back previously owned stock
- Expanded the discussion of reference point adaptation

Chapter 4: Risk Perceptions

- Deleted the section Nature or Nurture? (which is now in the new [Chapter 12](#))
- Added a discussion of how risk aversion changes through market cycles
- Added two cognitive dissonance studies

Chapter 5: Decision Frames

- Added a new subsection on framing in the decision to claim social security
- Expanded the discussion of professional investors and framing of risk and return

Chapter 6: Mental Accounting

- Added a new subsection about whether money makes you happy
- Added a discussion of mental accounting and gift cards

Chapter 7: Forming Portfolios

- Added a discussion of penny stocks
- Added a discussion of mini-portfolios to match multiple investment goals
- Expanded the $1/n$ rule discussion to include investor experience

Chapter 8: Representativeness and Familiarity

- Added a new subsection on familiarity and company name fluency
- Expanded the home bias discussion to include asset pricing

Chapter 9: Social Interaction and Investing

- Added studies on social media
- Added a study on Mad Money
- Deleted the section Speed is Not of the Essence

Chapter 10: Emotion and Investment Decisions

- Expanded the discussions of association between weather, mood, and risk aversion
- Added discussions of investor mood derived from popular TV series finales
- Discussed the association between negative mood in society measured from suicide rates and stock market returns

Chapter 11: Self-Control and Decision Making

- Added a sixth strategy for controlling biases
- Restructured the Choice Architecture section
- Added a subsection in Choice Architecture for increasing savings through social influences

Chapter 12 (previous edition): Psychology in the Mortgage Crisis

- Removed this chapter

Chapter 12 (new): Physiology of Investing

- Added a new chapter

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 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 of 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 of when, how, and why psychology affects investing continue, 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*.

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.

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) 164 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?

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 2017?	_____	_____
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 2016?	_____	_____
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?	_____	_____

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 firsthand, 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.

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 like 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.

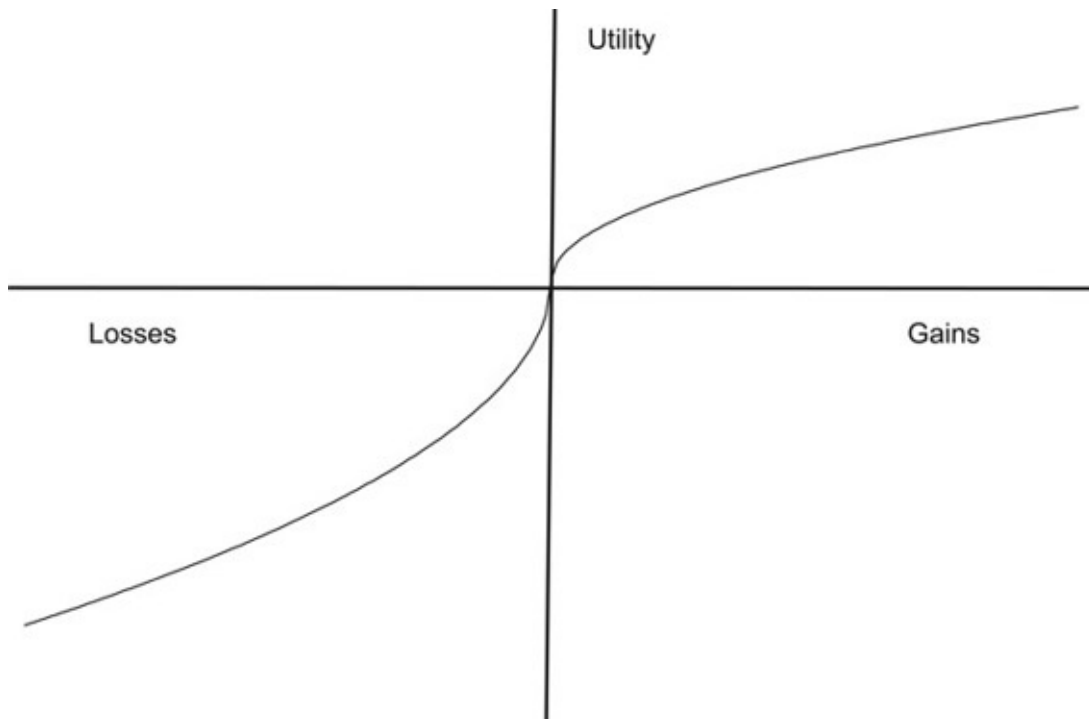
► Sources of Cognitive Errors

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](#).

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](#)).



[Figure 1.2](#) Prospect Theory Value Function

An additional aspect of prospect theory is that people segregate each investment to track gains and losses and periodically reexamine 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. So 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 as equally 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 last 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 (like Save More Tomorrow and Save to Win) that are designed using people's biases to help them save more. Lastly, [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.

► 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, “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.

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 of 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.

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 conducted in early 2001 demonstrates this overconfidence. Of particular note is that many of those surveyed had recently experienced some negative outcomes after the technology stock bubble collapsed. When asked what they thought the stock market return would be during the next 12 months, the average answer was 10.3 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 have been shown 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.

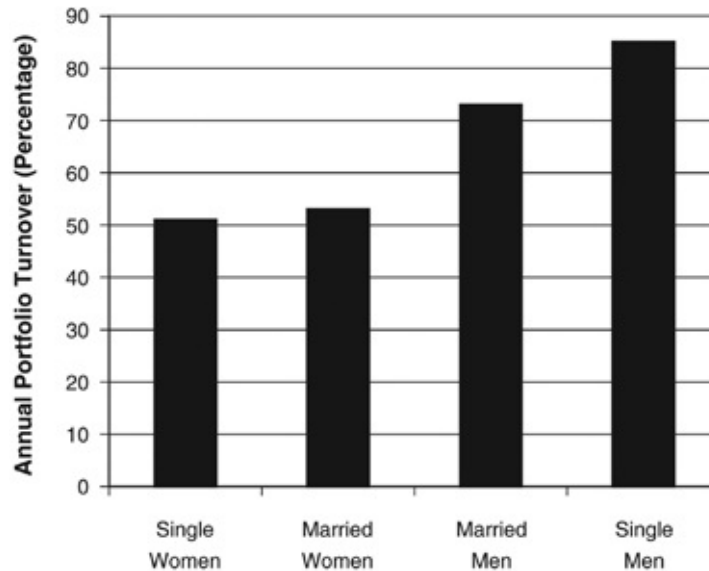
Overconfident Trading Psychologists have found that men are more

overconfident 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 between 1991 and 1997.⁷ 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 during one year's time.

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 in annual turnover, respectively. Note that this is consistent with overconfidence; that is, male investors are more overconfident than female investors, leading to higher levels of trading.

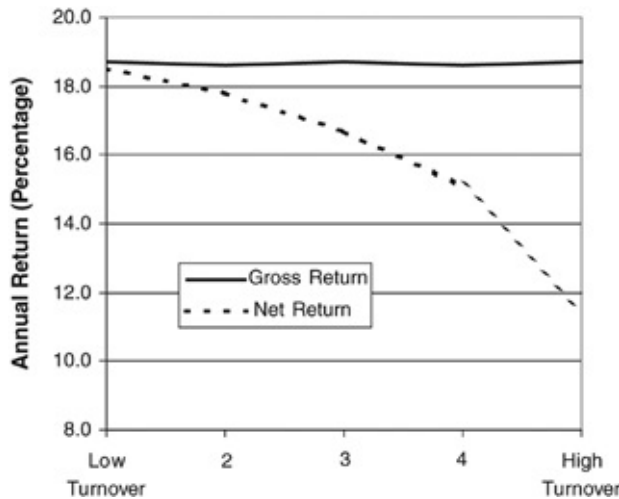
On the other hand, it is possible that men are not overconfident but rather that they might be better informed. If you truly have better information, trading based on that information should lead to achieving higher returns.



[Figure 2.1](#) Annual Portfolio Turnover by Gender and Marital Status

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 the period 1991–1996, 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 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 over-confidence, 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](#) Annual Return of Investors Sorted by Portfolio Turnover

[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 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, 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, like 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.

In fact, few chat-room recommendations may be from experts. A recent 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, like 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 suggest 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 likely 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 labeled 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 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.

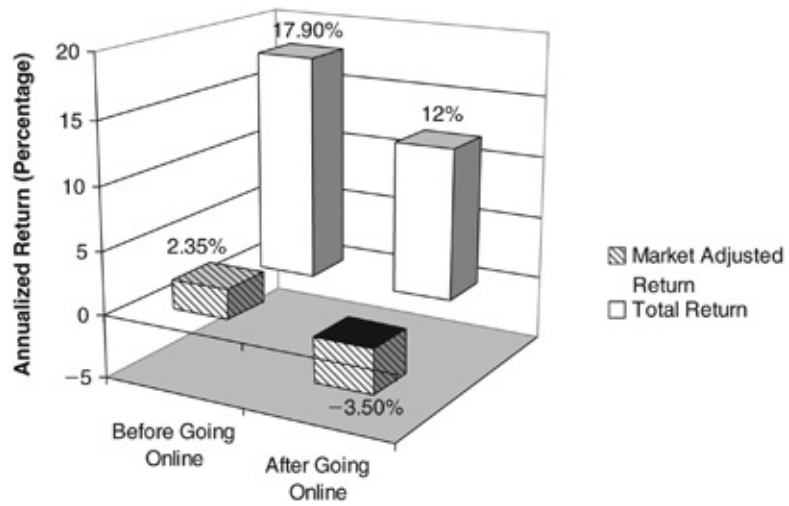


Figure 2.3 Annualized Market-Adjusted Return and Total Return of Investors Before and After Switching to an Online Trading System

► 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, like 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?

► Notes

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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. 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

[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

Why is it a problem that investors may sell their winners more frequently than their losers? One reason relates to the U.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 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.

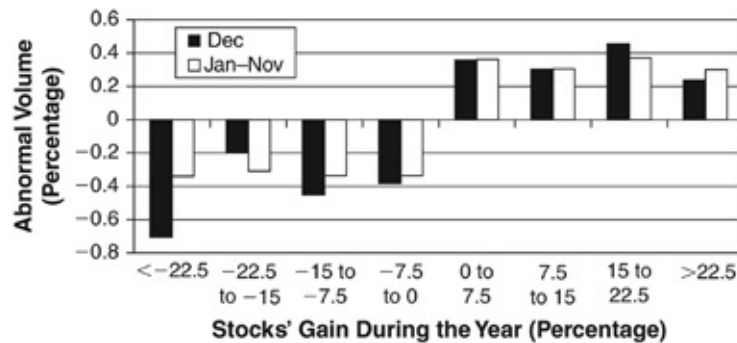
Ferris et al. used a methodology that determined the normal level of volume expected for each stock. They reported results that could be interpreted as a form of abnormal volume; that is, a negative abnormal volume indicates less trading than normal, whereas a positive abnormal volume indicates more trading than normal. Using the 30 smallest stocks on the New York Stock Exchange (NYSE) and the American Stock Exchange from December 1981 to January 1985, 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](#) shows that investors avoid regret and seek pride as much in December as during the rest of the year.

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.⁴ A round-trip trade is a stock purchase followed later by the sale of the stock.



[Figure 3.1](#) Volume of Stocks After Losses and Gains

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 1 month, 1 to 6 months, 6 to 12 months, and more than 1 year. The figure indicates

that investors are quick to realize their gains. The average annualized return for stocks purchased then sold within 1 month was 45 percent. The returns for stocks held 1 to 6 months, 6 to 12 months, and more than 1 year were 7.8 percent, 5.1 percent, and 4.5 percent, respectively. It appears that investors are quick to sell winners.

Using a more recent sample, Terrance Odean studied the trades of 10,000 trading accounts from a nationwide discount brokerage from 1987 to 1993.⁵ 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.

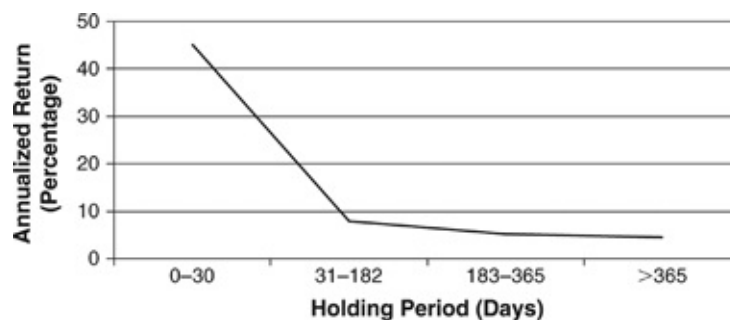


Figure 3.2 Annualized Return for Different Investor Holding Periods

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.⁶ 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 1996.⁷ 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 find 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.⁸ Investors hold losers twice as long as winners! Chinese investors also realize more gains than losses and hold losers ten days longer than winners.⁹

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.¹⁰ Corporate managers with employee stock options exhibit a disposition effect in their willingness to exercise those options.¹¹ In the real estate market, homeowners are reluctant to sell their homes below their original purchase price.¹²

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.¹³ 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.¹⁴ 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 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.¹⁵ 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.¹⁶ 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 1991.¹⁷ 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.¹⁸ 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 reexamines 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 like he made a profit, or does he feel like 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.¹⁹ 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.²⁰

Regarding individual stocks, an interesting investigation of the exercising of stock options illustrates a reference point.²¹ 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 onto 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.²² 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 like 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 in 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.²³

► Can the Disposition Effect Impact the Market?

Professors Vijay Singal and Zhaojin Xu examined the portfolios and trading of mutual funds.²⁴ They found that 30 percent of mutual funds exhibit the disposition effect. These disposition funds underperform the other funds by 4 to 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.²⁵ 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 postannouncement price drift. Frazzini showed that the postannouncement 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 postannouncement 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

Do 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.²⁶

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.²⁷ 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.

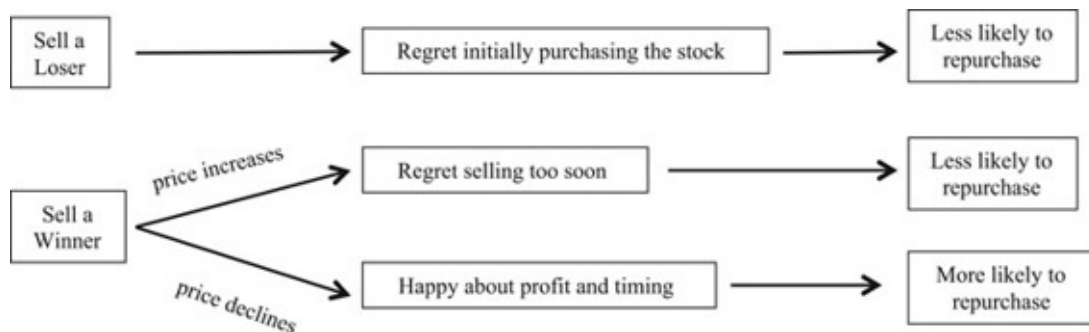
► Buying Back Stock Previously Sold

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.²⁸ 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 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 than later declined.

Studying actual trades of investors during 1991 to 1999, 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.²⁹ 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. Lastly, we show that this behavior is sub-optimal and that more sophisticated investors are less likely to engage in it.



[Figure 3.3](#) The Dynamics of Repurchasing a Stock Previously Sold

► 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 like 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

- [1](#) This example is adapted from Roger G. Clarke, Stock Krase, and Meir Statman, “Tracking Errors, Regret, and Tactical Asset Allocation,” *Journal of Portfolio Management* 20 (1994): 16–24.
- [2](#) Hersh Shefrin and Meir Statman, “The Disposition to Sell Winners Too Early and Ride Losers Too Long: Theory and Evidence,” *Journal of Finance* 40 (1985): 777–790.
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- [14](#) Tom Y. Chang, David H. Solomon, and Mark M. Westerfield, “Looking for Someone to Blame: Delegation, Cognitive Dissonance, and the Disposition Effect,” *Journal of Finance* 71 (2016): 267–302.
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- [16](#) Martin Weber and Colin F. Camerer, “The Disposition Effect in Securities Trading: An Experimental Analysis,” *Journal of Economic Behavior and Organization* 33 (1998): 167–184.
- [17](#) John R. Nofsinger, “The Impact of Public Information on Investors,” *Journal of Banking and Finance* 25 (2001): 1339–1366.
- [18](#) This discussion is adapted from Roger G. Clarke, Stock Krase, and Meir Statman, “Tracking Errors, Regret, and Tactical Asset Allocation,” *Journal of Portfolio Management* 20 (1994): 16–24.
- [19](#) Markku Kaustia, “Market-wide Impact of the Disposition Effect: Evidence From IPO Trading Volume,” *Journal of Financial Markets* 7 (2004): 207–235.
- [20](#) See Jun Li and Jianfeng Yu, “Investor Attention, Psychological Anchors, and Stock Return Predictability,” *Journal of Financial Economics* 104 (2012): 401–419.
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Risk Perceptions

A person who has not made peace with his losses is likely to accept gambles that would be unacceptable to him otherwise.

Kahneman and Tversky¹

Consider this wager on a coin toss: heads you win \$20, tails you lose \$20. Would you take this gamble? By the way, you won \$100 earlier. Now would you take this gamble? Did your answer change after finding out that you had won earlier? What if you had lost \$20 earlier? Would this make the gamble look any different to you?

Many people will take the gamble in one situation but not in another. The odds of winning the \$20 do not change in the different scenarios, so the expected value of the gamble remains the same. Neither the risk nor the reward of the gamble changes between situations; therefore, people's reaction to risk must change.

People's perception of risk does appear to vary. One important factor in evaluating a current risky decision is a past outcome. In short, people are willing to take more risk after earning gains and less risk after losses. To illustrate this behavior, Richard Thaler and Eric Johnson asked 95 undergraduate economics students to take a series of two-step gambles using real money.² In the first step, money was either given to or taken from the student. In the second step, the student was asked whether he or she wished to take the gamble presented. Their findings suggest a "house-money effect," a risk-aversion (or snakebite) effect, and a "trying-to-break-even effect," which are discussed in the following sections.

► House-Money Effect

After people have experienced a gain or profit, they are willing to take more risk. Gamblers refer to this feeling as playing with the house's money. After winning a big sum, amateur gamblers do not fully consider the new money as their own. Are you willing to take more risk with your opponent's money or your own money? Because gamblers don't fully integrate their winnings with their own money, they act like they are betting with the casino's money.

You have just won \$15. Now you are faced with the opportunity to bet \$4.50 on a coin toss. Do you place the bet? Seventy-seven percent of the economics students placed the bet. After just receiving their windfall of \$15, most students were willing to take the risk. On the other hand, when students were asked to place a bet on a coin toss without receiving the \$15, only 41 percent chose the gamble. Students are more willing to take a financial risk after a windfall profit even when not ordinarily inclined to take such a risk.

► Snakebite (Or Risk Aversion)

After experiencing a financial loss, people become less willing to take a risk. When faced with a gamble after already losing money, people generally choose to decline the gamble. Students who initially lost \$7.50 were then asked to wager \$2.25 on the flip of a coin. This time, the majority (60 percent) declined the gamble. After losing the initial money, the students might have felt “snakebit.”

Snakes do not often bite people, but when they do, people become more cautious. Likewise, after having been unlucky enough to lose money, people often feel they will continue to be unlucky; therefore, they avoid risk.

► Trying to Break Even

There is an important and powerful exception to the risk aversion response to a loss. People often jump at the chance to recoup their losses. After having lost some money, a majority of the students accepted a “double-or-nothing” toss of the coin. In fact, a majority of the students were willing to accept a double-or-nothing toss of the coin even when they were told the coin was not “fair”; that is, students were willing to take a risk even though they knew they had less than a 50 percent chance of winning. The need for breaking even appears to be stronger than the snakebite effect.

Another example of this break-even effect can be seen at the racetrack. After a day of betting on horses and losing money, gamblers are more likely to bet on long shots.³ Odds of 15 to 1 mean that a \$2 bet would win \$30 if the horse wins. Of course, horses with odds of 15 to 1 are unlikely to win. The proportion of money bet on long shots is greater toward the end of the race day than at the beginning. It appears that gamblers are less likely to take this risk early in the day. However, those gamblers who have won money (house-money effect) or lost money (break-even effect) during the day are more likely to take this kind of risk. Winners take this risk because they feel as though they are playing with the house’s money. Losers like the opportunity to break even without risking too much more. People without significant gains or losses prefer not to take the risk.

The willingness to increase the level of risk taken is periodically demonstrated in *Deal or No Deal*, a very popular TV show worldwide. In the show, a contestant picks one briefcase for himself or herself with an unknown amount of money in it. The contestant then picks 5 of the remaining 25 to be opened and removed from the game. In the U.S. version of the show, the briefcases have a known distribution of money ranging from \$0.01 to \$1,000,000. Removing the 6 briefcases leaves 20 and a new distribution of money left to win. The contestant is then given an offer of a specific amount of money to end the game. Should he take the

sure thing, or gamble and keep playing? Consider that the expected value of the gamble might be \$50,000 and the offer is \$30,000. Note that this offer is less than (60 percent of) the expected value of the gamble. Highly risk-averse contestants may take the offer—less risk-averse people will continue to play and pick more briefcases to open. Picking high-value (low-value) briefcases will lower (raise) the next offer.

An analysis of *Deal or No Deal* shows that the level of risk aversion shown by the contestants depends on the earlier outcomes experienced.⁴ Specifically, when a contestant is unlucky in selecting briefcases with high-value monetary amounts to open, the next offer will then be lower than the previous one. Because the contestant is anchored on the previous offer, the new one feels like a “loss” of money. When this occurs, contestants rarely take the new offer and instead gamble in order to catch up or get even. This appears to be true even when an extremely good offer is given. Refer back to the expected gamble of \$50,000 and regard it as the last two briefcases that happen to hold \$100,000 and \$0.01. What if the sure-thing offer was for \$60,000? All else equal, nearly everyone would take for-sure \$60,000 over this risky gamble with a lower expected payoff. But all else is not equal if the last offer was for a larger amount, say, \$90,000. The desire to “break even” appears to cause contestants to seek risky gambles. They seem to seek these risky gambles only after seeing the expected payoff (and thus the following offer) tumble.

Lastly, consider the professional, full-time proprietary traders in the Treasury bond futures contract at the Chicago Board of Trade. These traders take risky positions during the day and provide market-making services to earn a profit. All positions are usually closed out by the end of the day. With a single-day focus on profits, what do these traders do in the afternoon when they have lost money in the morning? Joshua Coval and Tyler Shumway examined the trades of 426 such traders in 1998.⁵ They found that after losing money in the morning, the traders are more likely to increase their level of risk in the afternoon in an attempt to make back the losses. In addition, these traders are more likely to trade with other proprietary traders (instead of orders coming into the market from investors). These trades turn out to be, on average, losing trades. This illustrates the change

in behavior that an investor might exhibit after experiencing a loss.

► Effect on Investors

The house-money effect predicts that investors are more likely to purchase risky stocks after closing out a successful position. In other words, after locking in a gain by selling stock at a profit, investors are more likely to buy higher-risk stocks. Massimo Massa and Andrei Simonov studied households in Sweden with data on both real estate and stock holdings.⁶ They found that increases in capital gains one year leads to a higher amount of risk taking in the following year, which is consistent with the house-money effect. Losses lead to decreased risk taking—a snakebite reaction. Their findings hold for people in different wealth classes and for both real estate and stock market gains.

The snakebite effect can affect investors in other ways too. New or conservative investors might decide to “give the stock market a try.” Adding some stocks to a portfolio gives the long-term investor better diversification and higher expected returns. However, if those stocks quickly decline in price, the first-time stock investor might feel snakebit. Consider a young investor who began by buying shares of a biotechnology company at \$30 per share. Three days later, the stock price declined to \$28, and the investor panicked and sold the stock. Later, the stock went up to \$75, but he or she is “afraid to get back in the market.”⁷

Note that risk aversion is not a constant. It varies over time and depends on the recent return path. Even finance professionals exhibit a varying aversion to risk. A group of economists tested 162 financial professionals in Switzerland after priming them with a boom or bust scenario.⁸ They used an experimental design in which traders could earn real money. Half of the subjects were primed with a bust scenario; that is, they were shown graphs in which the stock market had recently declined. The other half were primed with a bull market scenario. The bust-primed subjects showed much lower allocations to stocks than the bull-primed subjects. Fear increased risk aversion. The authors conjecture that this behavior exacerbates stock market cycles. Large market declines lead to higher

risk aversion and low allocations to stocks. Those adjustments lead to further declines. Large market increases lead to lower risk aversion and a higher allocation to stocks, which leads to further increases. In other words, investor behavior extends bull and bear markets.

► Endowment (Or Status Quo Bias) Effects

People often demand much more to sell an object than they would be willing to pay to buy it. This is known as the endowment effect.⁹ A closely related behavior is people's tendency to keep what they have been given instead of exchanging it, known as status quo bias.¹⁰

Economists have examined the endowment effect by conducting experiments using their students. A common experiment is to give an object such as a university coffee mug to half the students in class. An ensuing market is created so that those students with mugs who do not want them can sell them to students who want the mugs but do not have them. Traditional economic theory predicts that a market-clearing price will develop such that half the mugs will exchange hands. That is, half the students who were given mugs will sell them to half the students who did not receive a mug. However, in repeated experiments, students endowed with a mug typically demand twice the price that students without a mug are willing to pay. As a consequence, few mugs are actually traded. This finding also occurs in experiments using different objects and using a repeating game, where students gain experience trading in this type of market.¹¹

What creates this endowment effect? Do people overestimate the value of the objects they own, or does parting with them cause too much pain? Consider the following experiment.¹² Students were asked to rank the attractiveness of six prizes. A less-attractive prize, a pen, was given to half the students in the class. The other half of the class had a choice between the pen and two chocolate bars. Only 24 percent of the students picked the pen. The students who were originally given the pen were then given the opportunity to switch to the chocolate bars if they wanted. Even though most students ranked the chocolate higher than the pen as a prize, 56 percent of the students endowed with the pen elected not to switch. It does not appear that people overestimate the appeal of the object they own. Rather, they are more affected by the pain associated with giving up the

object.

The endowment is also prevalent in people who routinely take part in real trading markets. For example, John List conducted trading experiments with collectible Cal Ripken and Nolan Ryan baseball memorabilia with customers and dealers at a sports-card show.¹³ He also conducted a similar experiment at the collector pin market at the Epcot Center. These participants were presumably familiar with trading. Yet, after receiving one collectible, few were willing to trade it for the other collectible of equal value. List found that the more-experienced dealers seemed to suffer less from the endowment effect.

Endowment and Investors How can endowment or status quo bias affect investors? People have a tendency to hold the investments they already have. For example, William Samuelson and Richard Zeckhauser asked students to imagine that they just inherited a large sum of money. They could invest the money in different portfolios. Their choices were a moderate-risk company, a high-risk company, Treasury bills, or municipal bonds.¹⁴

Many versions of this question were asked. In some versions, the subjects were told that the inheritance was already invested in a high-risk company. In other versions, the inheritance came in the form of the other investment options. Interestingly, the form of the investment at the time of endowment heavily influenced the portfolio choices made by the student subjects. The high-risk company choice was more popular when the inheritance was already invested in the high-risk company. The same was true for the Treasury bill. Clearly, the expected risk and return of portfolios dominated by Treasury bills and high-risk companies are very different, yet subjects were more influenced by the status quo than by their own risk-and-return objectives. Financial advisors tell me that their clients are often willing to put a \$100,000 windfall from a year-end bonus in the stock market but want to put a \$100,000 windfall from an inheritance into a certificate of deposit. The clients say, “I can’t take risk with that money; my parents worked very hard for it!”

The status quo bias increased as the number of investment options increased. That is, the more complicated the decision to be made, the more likely the subject

was to choose to do nothing. In the real world, investors face the choice of investing in tens of thousands of company stocks, bonds, and mutual funds. All these choices may overwhelm some investors. As a result, they often choose to avoid making a change. This can be a particular problem when the investments have lost money. Selling a loser would trigger regret ([Chapter 3](#)) and the pain of losing the endowment.

► Perception of Investment Risk

How does the investment industry measure risk? What measures of risk do investors use to make decisions? Are the industry measures and peoples' preferences the same or even correlated? The answers to these questions are important for the investment industry, financial advisors, and our knowledge about investor behavior.

While the investment industry focuses on standard deviation as the primary measure of risk, investors may find other measures useful, like the probability of a loss or the magnitude of potential loss. To simulate an investment-like decision, a series of repeated gamble experiments were conducted. Consider the gamble where you have half a chance to win \$200 and half a chance to lose \$100. What does the distribution of outcomes look like if this gamble is repeated 50 times? What are the risks?

In a series of similar repeated gambles, participants were asked to estimate the standard deviation of outcomes, probability of loss, and average magnitude of a loss when one occurs. In addition, each person was asked to rate the riskiness of the repeated games on a scale of 1 to 100.¹⁵ The subjects strongly overestimated the probability of a loss and had difficulty estimating the average loss magnitude when a loss occurred. The subjects also did a poor job of estimating the standard deviation, although there was no systematic over- or underestimation. Clearly, people have difficulty in quantifying risk. However, their risk rating (1 to 100) for each repeated gamble was positively correlated with the probability of loss and magnitude of loss. This suggests that investors do incorporate these risk measures into their own risk ratings. Unfortunately for the investment industry, standard deviation was not correlated with their judgment of risk.

Overall, people are not generally able to assess the statistics of outcome distributions. Therefore, people making decisions about their retirement

investments may not be aware of the consequences of their actions.

► Memory and Decision Making

Memory is not as much a factual recording of events as it is a perception of the physical and emotional experience. This perception is affected by the way in which the events unfold. The process that records events in the brain can store different features of the experience. These stored features are the basis for subsequent recall.

Memory has an adaptive function. It determines whether a situation experienced in the past should be desired or avoided in the future. For example, if you remember an experience as having been worse than it really was, you would be excessively motivated to avoid similar experiences. Alternatively, if you remember an experience as better than it was, you will invest too much effort in seeking similar experiences. Therefore, inaccurate perceptions of past experiences can lead to poor decisions.

Memory and Investment Decisions Inaccurate memories can affect investors as well. The price pattern of a stock can affect how an investor makes decisions in the future. Consider this example of an investor purchasing two stocks. The investor buys the stock of a biotechnology firm and a pharmaceutical company. Each stock is purchased for \$100. Throughout the following year, the price of the biotechnology stock slowly declines to \$75. The price of the pharmaceutical stock stays at \$100 until the very end of the year, when it plunges to \$80.

For the year, the biotechnology stock performed worse than the pharmaceutical stock. However, the two stocks lost money in different ways. The biotechnology stock experienced a gradual decline. The pharmaceutical stock experienced a dramatic loss at the end. The memory of the large loss at the end of the year is associated with a high degree of emotional pain. The memory of the slow loss creates less emotional pain. This can occur even though the biotechnology stock (the slow loser) performed worse. Therefore, when making decisions about these

stocks for the following year, the investor might be overly pessimistic about the pharmaceutical stock.

This same pattern occurs for pleasurable experiences. People feel better about experiences with a high-pleasure peak and end. Consider a scenario in which the two stocks increased in price. The biotechnology stock slowly increased to \$125 over the year. The pharmaceutical stock rose dramatically to \$120 at the end of the year. The memory of these events causes the investor to feel better about the pharmaceutical stock even though it did not perform as well.

► Cognitive Dissonance

Psychologists have studied specific consequences of memory problems. Consider that people typically view themselves as “smart and nice.” Evidence that contradicts this image causes two seemingly opposite ideas. For example, suppose you want to think of yourself as nice, but the memory of one of your past actions suggests that you are not nice. Your brain would feel uncomfortable with this contradiction. Psychologists call this feeling *cognitive dissonance*. Simply stated, cognitive dissonance means that the brain is struggling with two opposite ideas—I am nice, but I did something that was not nice—and that struggle is an unpleasant feeling. To avoid this psychological pain, people tend to either:¹⁶

- (1) ignore, reject, or minimize one of the memories or beliefs,
- (2) change one or both of the ideas so that they match better, or
- (3) add a third, related idea that can attenuate the dissonance.

For example, people will ignore or dismiss bad news about a stock they just purchased. They will also misremember prior investment performance that contests their beliefs about being a good investor.

Lastly, people often blame others when things go against them. This is particularly true in the investment arena. Financial advisors, mutual fund managers, stock brokers, and portfolio managers are all positioned to be the scapegoat when returns are poor.

People’s beliefs can change to be consistent with past decisions. We want to feel like we made the right decision. For example, racetrack gamblers were surveyed about the odds of “their horse” winning. Bettors just leaving the betting window gave their horse a better chance of winning than bettors standing in line to place their bets.¹⁷ Before placing the bet, gamblers feel more uncertain about their chances. After placing the bet, their beliefs change to be consistent with their decision.

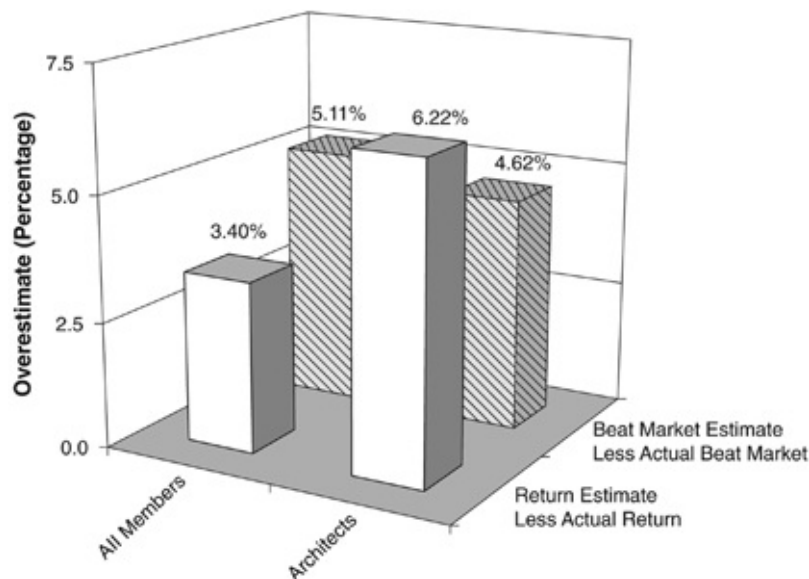
Resolving the unpleasant feeling of cognitive dissonance can affect the decision-making process in two ways. First, people may fail to make important decisions because it is too uncomfortable to contemplate the situation. For example, when considering the thought of saving for future retirement, some younger people may conjure an image of a feeble person with low earning power. To avoid the conflict between their good self-image and the contradictory future self-image, they avoid saving entirely. Second, the filtering of new information limits the ability to evaluate and monitor our investment decisions. If investors ignore negative information, how are they going to realize that an adjustment in their portfolio is necessary? Lastly, they can blame others and gain satisfaction by removing those people from their decision process. That is, investors are very willing to sell an underperforming actively managed mutual fund.

Cognitive Dissonance and Investing Investors seek to reduce psychological pain by adjusting their beliefs about the success of past investment choices. For example, at one point in time, an investor will make a decision to purchase a mutual fund. Over time, performance information about the fund will make him or her either validate or put into question the wisdom of picking that mutual fund. To reduce cognitive dissonance, the investor's brain will filter out or reduce the negative information and fixate on the positive information. Therefore, investor memory of past performance is better than actual past performance. In other words, you view yourself as a good investor, so the memory of your past investment performance adapts to be consistent with the self-image. You remember that you have done well regardless of the actual performance.

William Goetzmann and Nadav Peles measured the recollections of investors.¹⁸ They asked investors two questions about the return on their mutual fund investments during the previous year: (1) What was the return last year? (2) By how much did you beat the market? Note that these questions ask about actual performance and performance relative to possible alternatives. If investors are not biased by cognitive problems, then the average recollection of performance should be equal to the actual performance. If they do suffer from cognitive dissonance, they will misremember their return as higher than it really was.

Goetzmann and Peles posed these questions to two groups of investors. The first

group consisted of architects. Architects are highly educated professionals, but they might not be knowledgeable about investing. Twelve architects responded regarding 29 investments they owned through their defined contribution pension plan. [Figure 4.1](#) shows the architects' errors in their recollections. On average, they recalled an investment performance that was 6.22 percent higher than their actual return. They thought they did much better than they actually did.



[Figure 4.1](#) Errors in Memory (Cognitive Dissonance)

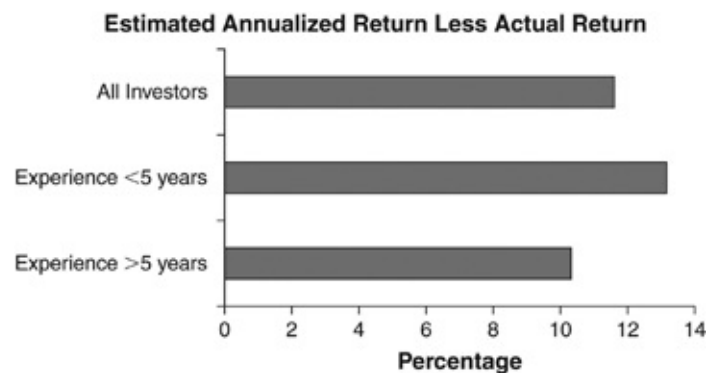
It is difficult to outperform the market. Most stock mutual funds cannot consistently beat the Standard & Poor's (S&P) 500 Index. So how did the architects think they did? On average, their estimate of how much they beat the market was 4.62 percent too optimistic. This group of investors overestimated their actual return and overestimated their return relative to a benchmark.

Responses from a second group of investors were collected from members of a state chapter of the American Association of Individual Investors (AAII). The AAII is an association that provides education, information, and services to individual investors. Presumably, the members of the AAII are well educated in investing. Do these investors overestimate their past returns?

Twenty-nine AAII members responded concerning 57 mutual funds they owned. These investors overestimated their past returns by 3.40 percent, on average. They

overestimated their performance relative to the market by 5.11 percent. Even though these people are educated investors, they are also overly optimistic in recalling their past returns. This is an example of changing one of the thoughts to be more consistent with their positive self-image.

In a similar investigation, Markus Glaser and Martin Weber asked online German investors about their annual returns from 1997 to 2000.¹⁹ They compared each response to the actual annualized return from the investors' brokerage accounts. [Figure 4.2](#) shows that the mean difference between the estimated return and actual return was over 10 percent. The investors overestimated their performance by 11.6 percent. Unfortunately, experienced investors did not remember their return much better. Low-experience investors overestimated by 13.2 percent, while the more-experienced investors overestimated by 10.3 percent. Glaser and Weber concluded that investors will have difficulty learning from their mistakes if they do not know or remember those mistakes.



[Figure 4.2](#) Overestimation of Past Returns by Online Investors in Germany

Also consider the responses of investors in a simulated market experiment.²⁰ The performance of ten real mutual funds, a money market fund, and the S&P (Standard and Poor's) 500 Index over the ten-year period of 1985–1994 were used in the simulation. Eighty master's-level business students allocated \$100,000 to the investments as they wanted. Then six-month returns were revealed to the investors, and they could reallocate their portfolios. This was repeated until 20 turns of the game were completed. Note that throughout the experiment, the players saw the market return (as proxied by the S&P 500 Index) and their own portfolio holdings. After the game, the players were asked how they performed:

What return did they get? Did they beat the market? On average, the players reported that they beat the market. This is a rosy perception of their performance because the group's average return was 8 percent below the market. When asked about their returns, only 15 of the 80 were correct. A majority (47 out of 80) overestimated their total return.

The “blame others” aspect of resolving cognitive dissonance was investigated by three scholars using an experimental approach and 520 undergraduate students in finance classes.²¹ Half of the students were directed to trade stocks during the semester and the other half traded mutual funds. Both groups had to write the reason for each buy or sell trade with their order. Two different aspects of the experiment were varied. In the first treatment, some of the students had their reasons for buying their holdings prominently displayed in their trading program. This reminder of their prior thinking makes it difficult for them to ignore that they made a mistake. Other students did not have their reasons displayed. The reaction to the cognitive dissonance of seeing a loser stock in your portfolio is to either ignore it, or be biased toward selling winners and holding losers—the disposition effect (see [Chapter 3](#)). For stock traders, displaying the purchase rationale makes it difficult to ignore the losing stock. Thus, they are pushed to the disposition effect reaction. However, the mutual fund traders have a third option: they can blame the fund manager and sell the loser fund. This would exhibit the reverse disposition effect. The second treatment of the experiment varies the terminology for the mutual fund traders. Some of the fund traders used a trading system using the terms “buy,” “sell,” and “Portfolio performance.” The other fund trades saw these words replaced with “hire,” “fire,” and “Manager performance” in order to make the delegation aspect of funds more salient. The fund-trading students in the more salient group should exhibit more reverse disposition effect behavior than the less salient group. The results show that increasing the dissonance of the subjects by showing them their purchase rationale caused a greater disposition effect for stock traders and a greater reverse disposition effect for the fund traders. Also, increasing the focus on the delegation aspect of fund ownership increased the reverse disposition effect. Therefore, their results are consistent with those predicted by investors trying to resolve cognitive dissonance.

Lastly, consider this example of investors ignoring or minimizing information that conflicts with their existing beliefs. It appears that investors are especially prone to ignore negative news about their stocks during optimistic periods. During optimistic times, investors disregard bad news because it is inconsistent with their optimistic beliefs in the stocks they hold. In this case, cognitive dissonance slows the reaction of bad news. One study shows this by reporting that the reaction to a negative earnings surprise is longer during optimistic times. Specifically, they show that the negative post-earnings announcement drift is higher.²²

People want to believe that their investment decisions are good. In the face of evidence to the contrary, the brain's defense mechanisms filter contradictory information and alter the recollection of the decision. It is hard to objectively evaluate the progress toward investment goals or the need for an investment advisor when the recollection of past performance is biased upward. A third mechanism is to blame a financial advisor or portfolio manager. This often leads to active decisions to sell poor mutual funds much quicker than a person might liquidate a loser stock.

► Summary

Although we often think of some people as bigger risk takers than others, our risk aversion and risk tolerance is more dependent on previous successes and failures. People tend to increase their tolerance for risk after big gains (house-money effect) and after losses when there is a chance to break even. Otherwise, losses lead to reduced risk exposure. However, genetics (or nature) play just as large a role as individual characteristics and past experience in explaining someone's level of risk aversion.

When many investors are affected by these problems, the entire market can be affected. The psychological bias of seeking (or ignoring) risk because of the house-money effect contributes to the creation of a price bubble. The psychological bias of avoiding risk in the snake-bite effect leads to stock prices that are driven too low after the bubble collapses.

Also, human memory is more a recording of emotions and feelings of events than a recording of facts. This can cause investors to remember actual events inaccurately or even to ignore information that causes bad feelings to resolve the cognitive dissonance. Blaming others helps resolve the dissonance too. Misreading and overestimating prior performance will make it difficult to learn from mistakes.

► Questions

1. Poker games have become popular on television. The programs follow the action of no-limit hold 'em tournaments. You might observe that after winning a big pot, many gamblers bet the next hand even when they have poor cards. After losing a big hand, many gamblers tend not to bet the next hand even when they have good cards. Explain these two behaviors.
2. Describe the appeal of “double-or-nothing” gambles. Be sure to include reference points (from [Chapter 3](#)).
3. How does the flow of news and information impact the memory process to cause investors to remember a “rosy” view of past portfolio performance?
4. How does cognitive dissonance explain why investors hold loser stocks they own while being quick to sell loser actively managed mutual funds?

► Notes

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Decision Frames

The way in which a question is asked has a strong impact on the answer given or decision made. Consider the case of opting-in versus opting-out. To consent to be an organ donor in the United States, you must sign a paper when getting your driver's license. The consent is then noted on the license. This is an opt-in decision chosen by only about a quarter of drivers. The levels are even lower for countries like Germany and the United Kingdom.¹ On the other hand, a program can be designed in which every driver is automatically defaulted to be a donor. People not wishing to be an organ donor must sign a paper to opt out. The participation rate of organ donor consent in opt-out countries (like Austria, France, and Sweden) is typically in the high 90-percent range. The simple decision frame of having people opt out instead of opt in dramatically raises the participation rate.

► Framing and Choice

One very popular example of framing comes from Nobel laureate Daniel Kahneman about choosing a program to battle a disease outbreak:²

Imagine that the United States is preparing for the outbreak of an unusual disease, which is expected to kill 600 people. Two alternative programs to combat the disease have been proposed. Assume the exact scientific estimates of the consequences of the programs are as follows:

If program A is adopted, 200 people will be saved.

If program B is adopted, there is a 1/3 probability that 600 people will be saved, and a 2/3 probability that no one will be saved.

Which program would you choose?

Participants in the experiment are asked to choose a program. Now consider the altered programs:

The same disease is back. Only this time, the two programs now have the following payoffs:

If program C is adopted, 400 people will die.

If program D is adopted, there is a 1/3 probability that nobody will die, and a 2/3 probability that 600 people will die.

Which program would you support?

Participants are asked which of these two programs should be chosen. This is an example of positive and negative versions of framing. You may have noticed that program A and program C are the same programs. In both cases, 200 people will live and 400 people will die. The difference is that program A is framed in a positive manner—people living. Program C has a negative frame by describing the deaths. In addition, programs B and D are the same, except for the positive/negative frame.

If people are not impacted by the frame of the question, then the same proportion of people who pick program A in the positive frame would pick program C if

given the negative frame. But this did not turn out to be the case, as 72 percent of the people who were shown the positive frame picked the certain results in program A and only 28 percent picked the risky program B. When thinking about saving lives, most people did not want to take a risk. But when the negative frame was shown, only 22 percent picked the certain program C and 78 percent chose the risky program D. Note that in the negative frame, participants were far more interested in the risky program. People make different choices depending on the frame of the question posed.

The previous example included an emotional topic, namely people living or dying. Do framing effects occur in non-emotional settings?

Multiplication may be the least emotional mental process! Consider the experiment in which participants were given ten seconds to estimate the following problem: $2 \times 3 \times 4 \times 5 \times 6 \times 7 \times 8$. Another group of participants were given the problem: $8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2$. These are obviously the same problems with the twist that the numbers are arranged in the opposite order.³ Should the order (or frame) impact the estimate? Estimates from groups that viewed the first version averaged 512. Estimates for groups viewing the second version averaged 2,250. People came up with estimates more than 4 times higher simply because they anchored to the higher number 8 versus the lower number 2. So framing has an impact even on the mundane activity of math. By the way, people did not estimate very well as the answer is 40,320.

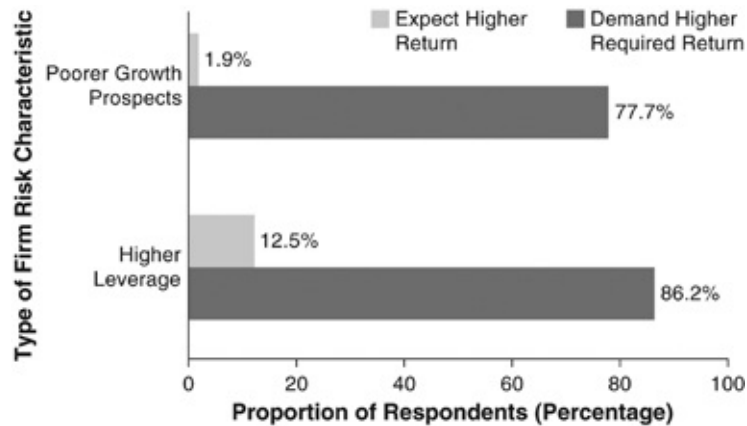
► Framing and Investing

Framing and the Risk-Return Relationship It is clear that the framing of a question influences the choices made. How might framing impact investment choices? The most fundamental principle in finance is the positive relationship between risk and expected return. Investors can expect higher returns from high-risk investments and lower returns from low-risk ones. Indeed, while asset pricing models might measure risk in different ways, they all require a positive risk premium to be associated with risk. Every student and practitioner of finance knows to demand a higher return in order to invest in a higher-risk stock.

There are potentially many types of risk for the stock market investor. Two firm characteristics that are considered to be associated with risk are the firm's leverage and growth prospects. A firm that uses more debt in its capital structure is considered to have more leverage and thus be riskier. Firms with poor growth prospects are often identified by their high book-to-market (B/M) ratio, which is related to the B/M risk factor in some asset pricing models. In a randomized survey experiment, 742 Finnish financial advisors were asked about the return of firms with these risky characteristics in two different frames.⁴

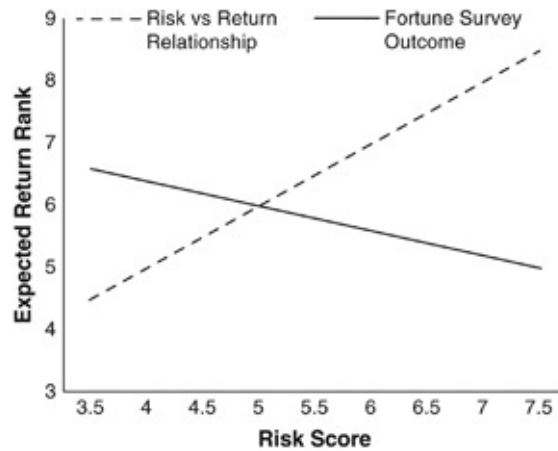
One frame asked about the risk premium demanded for firms with these leverage and growth characteristics. If an advisor believes that these are risk factors, then that advisor should respond that a risk premium is needed. Those advisors with this frame overwhelmingly responded that a risk premium is demanded—77.7 percent required the premium for poor growth firms and 86.2 percent required the premium for highly leveraged firms. With this added risk premium, the expected return would be higher for these higher-risk firms. This is consistent with the positive risk-return relationship. The other advisors were asked the question from a different frame. They were simply asked if firms with these characteristics would have higher, lower, or the same returns as firms without leverage and poor growth. In this frame, only 1.9 percent of the advisors believed

that poor-growth firms would earn a higher return. Only 12.5 percent believed higher-leverage firms would earn a higher return. In this frame, the advisors projected a *negative* risk-return relationship, which is the opposite of both financial theory and of the advisors answering from the first frame. [Figure 5.1](#) shows the comparison of responses between the two frames.



[Figure 5.1](#) Financial Advisor View of Risk and Return in Two Different Frames

Another example of the failure to apply the positive risk-return relationship occurs in a survey of high-net-worth clients of a U.S. investment firm.⁵ They were given a list of 210 firms from the annual *Fortune* survey of executives and analysts. Some of the investors were asked to denote the riskiness of each firm on a scale of 1 (low) to 10 (high). The others ranked the future return of each firm. Putting the two groups' responses together produced the positive risk-return relationship shown in the dashed line in [Figure 5.2](#). That is, firms generally considered to be riskier should also be expected to have a higher return—low-risk firms should be expected to provide low future returns. However, the responses reflected the solid line in the figure. High-risk firms were also expected to provide low returns.



[Figure 5.2](#) Executive and Analyst Risk and Return Perspectives

Finally, Hirsh Shefrin asked financial professionals about risk and return in surveys over a 15-year period.⁶ Shefrin asked for their assessment of risk and next year's expected return on a handful of well-known technology firms. In the workshops, subjects were provided comprehensive information about companies and allowed to use any information they normally use when assessing companies. When asked about the firm's risk, their responses were closely aligned with traditional theoretical measures of risk, like beta. Beta is used in asset pricing models to account for market risk. This risk is directly and positively related to expected return in the models. Higher beta leads to higher expected return. Because these finance professionals' estimates of risk were similar to beta, were their estimates of next year's return also related to risk? No. In fact, the correlation between the reported risk level and the estimated return was negative in every year except one. Again, investors (even professionals) seem to view high risk as being associated with low expected return, which is the opposite of financial theory.

Why do people who understand (and even agree with) the positive risk-return relationship often fail to apply that relationship? It is because of framing. When people frame the situation within a risk-return context, they usually get it right. But when they use a different frame, they fail to follow this relationship. Indeed, without expressly framing risk and return together, investors often use a frame of better/worse instead. Investors tend to think of stocks as better or worse. Better stocks have high returns and low risk. Worse stocks have low returns and high

risk. Unfortunately, the better/worse frame does not describe the risk-return relationship accurately, and thus investors often take more risk than they know.

Framing and Prediction Consider this question: If the Dow Jones Industrial Average had risen 20 percent last year to 8,000, what *level* do you estimate it will achieve at the end of this year? Now consider this slight change in the question: If the Dow Jones Industrial Average had risen to 8,000 last year, what *return* do you estimate it will provide this year?

These two questions are asking for the same prediction, but the first asks for a price forecast while the second asks for a return forecast. While this may seem trivial, it is not. In this scenario, people responding to the price version of the question would give an answer that is lower than implied by the people forecasting the return. A group of German scholars showed that when people identify a stock price trend and are asked to predict the future, they tend to extrapolate the trend (a representativeness bias) when responding in terms of changes or returns.⁷ Those people responding in the price-level mode tend to show a slowing or even reversal of the trend that can be considered a mean-reversion approach.

Forecasting is popular in finance and economics. Many organizations survey people asking for future returns, like the Michigan Survey of Consumers, Duke/CFO (chief financial officer) Business Outlook Survey, and UBS/Gallup. Other organizations ask for future prices, like the Livingston Survey of the Federal Reserve Bank of Philadelphia. Analysts also provide price targets on the stocks they follow. This return/price framing bias suggests that outlooks from return forecasts will be biased toward extending the current trend while price forecasts will tend more toward a belief in mean reversion.

When investors pick one stock instead of others, they are essentially making a prediction about that firm's risk and return relative to the others. An additional factor to framing that impacts prediction is the intelligence of the decision maker. Three scholars illustrate the role of intelligence in a data set of Finnish investors in which they have IQ information from prior (mandatory) military service.⁸ They find that the high IQ investors' portfolios outperform the low IQ investors

by 4.9 percent per year. This higher return stems from the higher IQ investors exhibiting better market timing and stock picking. In addition, they are less prone to the disposition effect and the sentiment of other investors.

► Thinking Mode and Decision Processes

In Daniel Kahneman's Nobel lecture delivered in Stockholm when he received the Bank of Sweden Prize in Economic Sciences, he outlined two different modes of cognitive reasoning.⁹ He describes the *analytical* thinking mode (what he calls reasoning) as what we do "when we compute the product of 17 and 258." On the other hand, the *intuitive* thinking mode is used when you are reluctant to eat a piece of chocolate that has been formed in the shape of a cockroach. The intuitive mode is spontaneous and effortless while analytical thought is deliberate and effortful.

Consider the example of driving a car while talking on a cell phone. Most drivers can carry on a conversation when the discussion is minor chit-chat and the driving requires only effortless cognitive processing. These intuitive activities can occur together because the brain can handle these cognitive processes in parallel. However, problems arise when the conversation and/or driving task requires more analytical processing (like a political debate or parallel parking). These analytically dominated activities require the brain to process in a more serial manner. Thus, either the conversation becomes interrupted or the driving does. Due to its effortless aspects, most judgments and choices are made intuitively.

However, many investment decisions require assessing uncertainty and risk, abstract ideas that could require significant cognitive effort. These decisions should also occur within the context of financial theory, like diversification, asset allocation, market efficiency, and risk versus expected return. It is likely that people who predominately make decisions using the intuitive mode might make different financial choices than those who predominately use the analytical mode.

In addition, thinking mode may impact how people view decision frames. For example, consider the gambler at a horse track who brought \$150 and has lost

\$140 of it. The gambler is considering betting the last \$10 on a 15-to-1 long shot.¹⁰ How is this decision framed? One could frame the decision in the positive frame of a choice between keeping \$10 for certain or taking a risk with a low probability to win \$150 and high probability to get nothing. On the other hand, the gambler could consider the negative frame of losing \$140 on the day for certain versus a risk of a high chance of losing \$150 for the day and a small chance of breaking even. Both frames are legitimate ways of thinking about the decision. However, prospect theory suggests people tend to take the certain option in the positive frame (keeping the \$10 and not making the 15:1 long-shot bet) and take the risky option in the negative frame (making the long-shot bet). Thus, how the gambler frames this decision will have a large impact on the decision made.

► Measuring Thinking Mode

Shane Frederick introduced three quick and simple questions called the cognitive reflection test (CRT) to measure the intuitive/analytical thinking mode.¹¹ The questions are designed such that the correct answer requires a more deliberate approach. However, there is an impulsive answer that quickly comes to mind. The intuitive thinker will pick this impulsive (but incorrect) answer while the analytical thinker deliberates a little longer to find the correct answer. The questions are:

If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets? (impulsive answer is 100 minutes; correct answer is 5 minutes)

In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half the lake? (impulsive answer is 24 days; correct answer is 47 days)

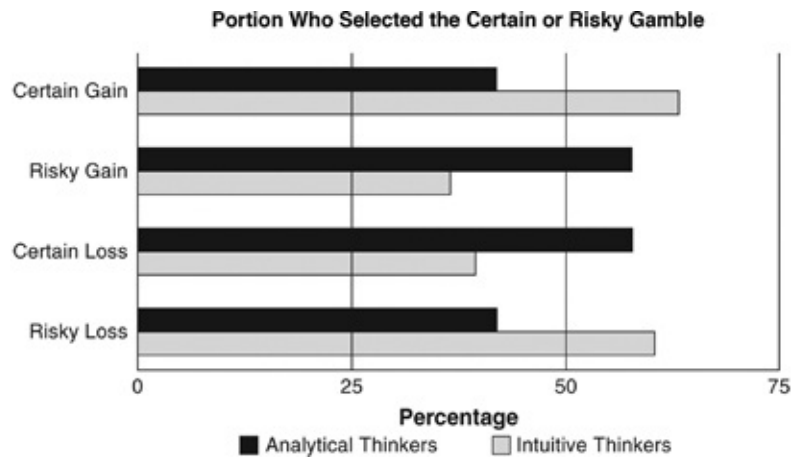
A bat and ball together cost \$1.10. The bat costs \$1.00 more than the ball. How much does the ball cost? (impulsive answer is 10 cents; correct answer is 5 cents)

The CRT measure is the number of correct answers. Therefore, a CRT score of 0 or 1 indicates an intuitive thinker while 2 and 3 denote an analytical thinker. Frederick reports that Massachusetts Institute of Technology students averaged a CRT score of 2.18. It is not surprising that students at one of the top engineering schools in the world would lean toward being analytical. A choir group at Harvard University averaged 1.43. An online study averaged 1.1, which might be explained as Internet activities tending toward quick, intuitive thinking processes.

► Risk Framing and Thinking Style

Like the gambler at the horse track discussed above, people may face decisions framed in the positive or negative. The infectious-disease example at the beginning of this chapter illustrates that people often make different choices when faced with the two frames. In general, prospect theory describes the tendency for people to choose the certain option when framed in a positive domain and choose the risky option when framed in the negative domain. Frederick reports that students with low CRT scores behave in a manner more consistent with the axioms of prospect theory than students with high CRT scores. He asks many versions of the questions in the gain domain, “*Which investment payoff would you pick? Receive (A) \$100 for certain or (B) a 50% chance to receive \$300 and a 50% to receive nothing.*” Note that the certain payoff of \$100 is less than the expected value of the gamble (\$150), which might be considered to include a risk premium. In addition, the loss domain questions were in the form of “*Which investment payoff would you pick? Lose (A) \$100 for certain or (B) a 50% chance to pay \$300 and a 50% chance to pay nothing.*” Here, the certain alternative has a higher expected value than the gamble.

Frederick found that low-CRT-score students picked A in the positive domain and B in the negative domain. High-CRT-score students did the opposite. But what about better-trained and more-experienced investors—do they behave in the same manner? I tested over 100 financial planners to find out.¹²



[Figure 5.3](#) Intuitive and Analytical Thinkers' Framed Risk Preferences

[Figure 5.3](#) shows the portion of financial planners, grouped by thinking mode, who selected the certain and risky options in the positive (gain) domain. Notice that more than half of the intuitive thinkers wanted the certain \$100 while a majority of the analytical planners wanted to take the gamble. In the loss domain, both groups switched. More than half of the analytical planners settled for paying the certain \$100, while more than half of the intuitive planners wanted the chance to break even.

This figure shows two important behavioral findings. First, people do not have one risk-aversion level. Instead, they may be risk seeking in one frame and risk averse in another. Second, intuitive thinkers behave along the axioms of prospect theory, while analytical thinkers do not.

► Framing Financial Decisions

We must constantly make decisions of which products to buy. It is no accident that we often have a choice from three. Do you want a tall, grande, or venti latte? We like our questions framed in such a way that we can easily compare. The rational economic decision maker was first purported to make the value-maximizing decision. But it appears now that we actually make many of our decisions based on *extremeness aversion*.

Extremeness aversion is demonstrated by Amos Tversky, co-creator of prospect theory, and colleague Itamar Simonson.¹³ Consider the purchase decision between two cameras: (1) Minolta X-370 for \$169.99, or (2) Minolta Maximum 3000i for 239.99. Given these two choices, 50 percent of the people pick the cheaper camera and 50 percent pick the more expensive one. But when a third, more expensive camera is offered (Minolta Maximum 7000i for \$469.99), 22 percent pick the cheaper priced camera, 57 percent pick the middle priced one, and 21 percent pick the expensive camera. Note that half of the people that would pick the cheap camera with only two offered end up picking a more expensive camera when a third high-priced camera is offered. This is because extremeness aversion causes us to avoid the most extreme appearing options. The cheapest camera does not appear extreme with only one other alternative. It does look “cheap” when compared to two more expensive alternatives.

Pension Decisions Some of the most important decisions that impact peoples’ future wealth are their pension plan decisions. Workers with a defined contribution plan must decide whether to contribute, how much to contribute, and how to allocate the investment to various asset classes. Given how important pension plans are to both individuals and to society, do we frame the decisions in ways that will foster optimal choices? Unfortunately, the answer is no. Traditionally, the new employee receives a thick packet of information and is told to return to the human resources office when they are ready to make their

choices. A majority never come back.

What framing problems are typical in a 401(k) pension plan? One issue is that employees really do not know what level of risk is appropriate for them. Because they are unsure, they tend to be extremeness averse. Shlomo Benartzi and Richard Thaler illustrate this with their experiments asking people which risk profiles they prefer.¹⁴ In the first framing of the question, Options A, B, and C are offered (see [Table 5.1](#)). When these three investment alternatives are offered, only 29.2 percent of the people preferred C over B. Is this just because most people feel that Option B is a better fit for them? Consider that the second frame offers Options B, C, and D. If people know their optimal level of risk, then most should still prefer B to C. However, in this frame, 53.8 percent of the people preferred C over B. Why do most people change their preference from B in the first frame to C in the second frame? It is because these are the alternatives that appear less extreme within their respective questions. People don't know what level of risk they should take, so they pick the one they perceive as moderate.

[Table 5.1](#) Extremeness Aversion in Risk Choices

First Frame	Option A	Option B	Option C	Option D
Good Market Conditions: 50% chance	\$900	\$1,100	\$1,260	
Bad Market Conditions: 50% chance	\$900	\$800	\$700	
Second Frame	Option A	Option B	Option C	Option D
Good Market Conditions: 50% chance		\$1,100	\$1,260	\$1,380
Bad Market Conditions: 50% chance		\$800	\$700	\$600

Data Source: Shlomo Benartzi and Richard Thaler, "How Much is Investor Autonomy Worth?" *Journal of Finance* 57> (2002): 1593–1616.

Another problem is the opt-in nature of the plans. Consider the organ donor program discussed at the opening of this chapter. Programs where drivers must opt-out of the organ donor program have a much higher organ donor volunteer rate than programs that require drivers to opt-in. An analysis of one 401(k) plan

transitioning from the traditional opt-in design to a new opt-out design found that the participation rate of new employees skyrocketed from 37 percent to 86 percent.¹⁵ The new framing of the decision to participate had a dramatic impact.

Another problem is the number of options available for investment allocation in pension plans. Even grocery shoppers can get overwhelmed by the number of choices available. For example, a store display of 6 flavors of jam results in more purchases than a display of 24 flavors of jam. Employees can also get overwhelmed when they have hundreds of investment choices in their pension plan. An overwhelmed employee delays making decisions so long that he or she never ends up participating in the plan. One study shows that the probability of participation by an employee falls by 1.5–2 percent for every ten mutual funds added to the menu. Having fewer funds to choose from leads to higher participation.¹⁶

The opt-in/opt-out choice and the number of investment alternatives are just two of the framing issues being studied in pension plan design.

Payday Loans A good example of manipulating behavior through frames occurs at payday lenders. Signs nudge borrowers to think in narrow frames. For example, large signs declare that financing fees of \$15 are charged per \$100 borrowed. Loans are typically for two weeks. However, borrowers average over \$350 in loan size and also average more than nine loans before finally paying off the debt. Can restating the facts help borrowers view the loan from a more broad frame and impact their desire to pay down the loan quicker?

This question is tested by Marianne Bertrand and Adair Morse at the University of Chicago. They survey borrowers after they have received a loan, asking questions about the borrowers and the purpose of the loan.¹⁷ Other information is obtained from the payday lender. The randomized experiment occurs by the loan cash being placed in different envelopes with printed facts. The control group envelopes include the payday company's standard logo and store information. The other envelopes display information on one of the following: (1) the true dollar cost of a \$300 loan over a variety of time periods, (2) the APR of the payday loan compared to other types of loans, or (3) the distribution of the time it

takes people to pay back the loan.

They find that the strongest frame displays the dollar cost, but all three reduce the likelihood of the borrower taking out another payday loan. Compared to the control sample, recasting the loan information to influence a broader frame decreased the number of borrowers who take out another payday loan by 11 percent. This has policy implications for laws about loan disclosures on all types of subprime lending.

Claiming Social Security Nearly all U.S. citizens will have to decide when to start claiming their Social Security benefits. People can start accepting benefits as early as age 62 or as late as age 70. The earlier you start the benefits, the lower the amount of the monthly income you get. Oops, I just framed that sentence as a loss. I should have said that the later you start your benefits, the higher your monthly income will be. Could this subtle framing of gain versus loss impact the decision about something so important? It does matter. In fact, prior to 2008, the Social Security Administration used to frame this decision in one of the worst possible ways—breakeven analysis. Consider two choices: claiming benefits on your 64th birthday versus 65th birthday. If you claim earlier, you get 12 more monthly payments. However, all of the monthly payments you receive will be smaller than if you waited. Breakeven analysis tells you how long you would have to live for the higher monthly payments to make up for the year's delay in income. This frame focuses you on making up losses and on your death. Two very negative frames!

A team of economists investigated different ways to frame the Social Security claiming decision.¹⁸ In the breakeven example above, there are three important behavioral treatments that can be varied to change the frame. The first one is the reference points—age 64 versus 65. Why not use 67 versus 68? The second treatment is the loss versus gain perspective—that is, getting less money versus getting more. Lastly, people tend to make different decisions when framing income as potential consumption versus potential investment returns. By varying the frame of the question for nearly 1,500 people, they found that the old breakeven analysis causes people to select a claiming age that is 16 months early, all else equal. People selected later claiming ages when:

- (1) the reference age in the example was older,
- (2) differences in money was expressed as gains, and
- (3) terms are consumption based.

Thus, framing has an important influence on when we decide to starting Social Security benefits.

► Summary

People seem to be fooled by decision frames. That is, the choices they make are influenced by the frame of the question. One such frame is the positive/negative context. Whether the frame or context is people saved versus deaths or profits versus losses, people prefer the low-risk option in the positive frame and the risky alternative in the negative frame, which is predicted by prospect theory.

Thinking mode may also be a factor. Intuitive decision makers behave in a manner consistent with prospect theory. However, those who use a more analytical process often do not. Thus, frames may influence people differently.

Frames impact investors too. The current design of many 401(k) plans use decision frames like opt-in and many investment menu choices that do not foster plan participation. Better designs can help people make better choices. However, note that the frame we see the most often in the media is one of a very short-term focus. The attention of TV, newspapers, and the Internet is always on how much the market moved *today*. We rarely are put into the frame of how asset classes have moved in the last ten years. It helps to reframe information in broader terms, whether it be investment focus, pension choices, or payday lending.

► Questions

1. When investors think of an investment as better or worse, how is it viewed differently from the risk-return relationship view? How might it impact an investor's portfolio?
2. Speculate how an intuitive thinker's investment decisions and portfolio might be different from an analytical investor's.
3. Give an example of how extreme aversion nudges you toward various consumer choices.
4. If participating in a defined contribution plan is good for employees, what framing characteristics might impede participation? How could they be changed?
5. How does narrow framing of loan characteristics impact borrowers' decisions?

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Mental Accounting

Businesses, governments, and even churches use accounting systems to track, separate, and categorize the flow of money. People, on the other hand, use a mental accounting system. Imagine that your brain uses a mental accounting system similar to a file cabinet. Each decision, action, and outcome is placed in a separate folder in the file cabinet. The folder contains the costs and benefits associated with a particular decision. Once an outcome is assigned to a mental folder, it is difficult to view that outcome in any other way. The ramifications of mental accounting are that it influences your decisions in unexpected ways.

Consider the following example:¹

Mr. and Mrs. J have saved \$15,000 toward their dream vacation home. They hope to buy the home in five years. The money earns 4 percent in a money market account. They just bought a new car for \$11,000 that they financed with a three-year car loan at 9 percent.

This is a common situation. People have money in savings that earns a low rate of return yet borrow money at a high interest rate, thus losing money. In this example, the vacation home savings in the money market account is earning a rate of 4 percent. Imagine how excited Mr. and Mrs. J would be if they found a safe investment earning 9 percent! But when the 9 percent opportunity came up, they probably didn't even consider it. That opportunity was to borrow the \$11,000 from their own savings (instead of the bank) and pay themselves a 9 percent interest rate. If they had done this, the vacation home savings in the money market account would have been more than \$1,000 higher at the end of the three years.

Money does not come with labels, so people put labels on it. We have designations like dirty money, easy money, free money, and so on. Mr. and Mrs. J labeled their savings as “vacation home” in a mental account. Although mixing the “new car” mental account with the “vacation home” account would have maximized their wealth, Mr. and Mrs. J could not bring themselves to do it.

Another example is the popular gift card. A set of experiments compare what kind of items people buy with gift cards versus cash or credit cards.² With all three forms of payment, you can buy a pleasurable item or a practical one—e.g., a book to read or a ream of paper for your printer. Note that in these experiments, the gifts have no sentimental value. They are not gifts from your uncle. Instead, they are payment for participating in an experiment. Yet, participants bought enjoyable items with the gift card more often than they did with cash payments. People tend to assign gift card money to a pleasurable mental account and thus buy something fun with it.

► Mental Budgeting

People use financial budgets to keep track of and control their spending. The brain uses mental budgets to associate the benefits of consumption with the costs in each mental account. Consider the pain (or costs) associated with the purchase of goods and services to be similar to that of the pain of financial losses. Similarly, the joy (or benefits) of consuming the goods and services is like the joy of financial gains. Mental budgeting matches the emotional pain to the emotional joy.

Matching Costs to Benefits People usually prefer a “pay-as-you-go” payment system because it provides a tight match between the benefits and costs of the purchase. However, things get more complicated when the pay-as-you-go system is not available.

Consider the following set of questions that investigate the timing of payments. Professors Drazen Prelec and George Loewenstein asked 91 visitors to the Phipps Conservatory in Pittsburgh the following questions.³ The first question was as follows:

Imagine that six months from now, you are planning to purchase a clothes washer and dryer for your new residence. The two machines together will cost \$1,200. You have two options for financing the washer/dryer:

- A. *Six monthly payments of \$200 each during the six months before the washer and dryer arrive.*
- B. *Six monthly payments of \$200 each during the six months beginning after the washer and dryer arrive.*

Which option would you choose? Note that the total cost is the same in both options; only the timing of the costs is different. Of the 91 people interviewed, 84 percent responded that they preferred the postponed payment schedule B. This is consistent with the cost/benefit matching of mental budgeting. The benefits of the washer and dryer will be used for a period of years after their purchase. Paying the cost over a concurrent period matches the cost to the benefit. Note

that option B is also consistent with traditional economic theories; that is, people should choose B because it is less expensive after considering the time value of money.

The next two examples are not consistent with traditional economic theories, and respondents did not select the wealth-maximizing option. Consider this example:

Imagine that you are planning to take a one-week vacation to the Caribbean six months from now. The vacation will cost \$1,200. You have two options for financing the vacation:

- A. *Six monthly payments of \$200 each during the six months before the vacation.*
- B. *Six monthly payments of \$200 each during the six months beginning after you return.*

Notice that the payment stream options are the same as in the prior question—six payments before or six payments after the purchase. The change is that the item being purchased has changed. The main difference is that the vacation is a purchase whose benefits will be consumed in a short time, whereas the benefits of the washer and dryer will be consumed over the course of years. Which option would you choose?

Sixty percent of the respondents selected option A, the prepaid vacation. In this case, the payment options do not match with the consumption of the goods. The benefits of vacations are consumed during the vacation, but this vacation must be paid for either before or afterward.

Traditional economic theories predict that people will prefer option B because it is cheaper after considering the time value of money. However, most people choose option A. Why? People believe that a prepaid vacation is more pleasurable than one that must be paid for later because the pain of payment is over. If payment is to be made later, the benefits of the vacation are diminished by wondering how much the pleasure is going to cost. An important factor in the “prepay or finance it” decision is the amount of pleasure expected to be generated by the purchase. The thought of paying for an item over the time that the item is being used reduces the pleasure of using that item. But let’s face it—using a washer and dryer is not that much fun anyway, so we might as well finance it. The dream home example at the beginning of this chapter is another matter. The pleasure of the dream home should not be tainted with debt and the thoughts of

future payments; therefore, Mr. and Mrs. J are prepaying (saving for) the house.

The third question to the visitors addressed income from overtime work to be performed: How would you like to get paid for working a few hours on the weekends during the next six months? Prepayment for work to be done in the future was not desirable. Sixty-six of the respondents preferred to get paid after doing the work instead of before. Again, this is not consistent with traditional economic theories. The wealth-maximizing option is to get paid earlier, not later.

Matching Debt In the vacation and overtime questions, people are expressing an aversion to debt when the good or service is consumed quickly. People show a preference for matching the length of the payments to the length of time the good or service is used. For example, using debt to purchase homes, cars, TVs, and so forth is popular because these items are consumed over many years. Using debt and paying off the purchase over time results in a strong match associated with the consumption of those items.

On the other hand, people do not like to make payments on a debt for a purchase that has already been consumed. Financing the vacation is undesirable because it causes a long-term cost on a short-term benefit. This is also true for the third question. People do not want to get prepaid for work because it creates a long-term debt (working weekends for the next six months) for a short-term benefit (getting paid). People prefer to do the work first and then get paid.

► Sunk-Cost Effect

Traditional economic theories predict that people will consider the present and future costs and benefits when determining a course of action. Past costs should not be a factor. Contrary to these predictions, people routinely consider historic, nonrecoverable costs when making decisions about the future. This behavior is called the *sunk-cost effect*.⁴ The sunk-cost effect is an escalation of commitment and has been defined as the “greater tendency to continue an endeavor once an investment in money, time, or effort has been made.”⁵

Sunk costs have two important dimensions: size and timing.⁶ Consider the following two scenarios:

A family has tickets to a basketball game, which they have been anticipating for some time. The tickets are worth \$40. On the day of the game, a big snowstorm hits their area. Although they can still go to the game, the snowstorm will cause a hassle that will reduce the pleasure of watching the game. Is the family more likely to go to the game if they purchased the tickets for \$40 or if the tickets were given to them for free?

The common belief is that the family is more likely to go to the game if they purchased the tickets. Note that the \$40 cost of the ticket does not factor into the hassle of the snowstorm or the pleasure derived from the game. Yet people consider the sunk cost in their decision whether to go. A family that pays for the tickets opens a mental account. If they do not attend the game, the family is forced to close the mental account without the benefit of the purchase, resulting in a perceived loss. The family wishes to avoid the emotional pain of the loss; therefore, they are more likely to go to the game. Had the tickets been free, the account could be closed without a benefit or a cost.

This example illustrates that the size of the sunk cost is an important factor in decision making. In both cases, the family had tickets, but it was the cost of the tickets (\$40 versus \$0) that mattered. The next example illustrates that the timing of the sunk cost is also an important component.

A family has long anticipated going to the basketball game, which will take place next week. On the day of the game, a snowstorm occurs. Is the family more likely to go to the game if they purchased the \$40 tickets one year ago or yesterday?

In both cases, the \$40 purchase price is a sunk cost. However, does the timing of the sunk cost matter? Yes, the family is more likely to go to the game if they purchased the tickets yesterday than if they purchased the tickets last year. The pain of closing a mental account without a benefit decreases with time. In short, the negative impact of a sunk cost depreciates over time.

► Economic Impact

The previous examples demonstrate that people are willing to incur monetary costs to facilitate their mental budgeting process. Remember that people tend to prepay for some purchases, and they prefer to get paid *after* doing work. By accelerating payments and delaying income, they are not taking advantage of the time value of money principles. Traditional economic theories predict that people would prefer the opposite: delaying payment and accelerating income to maximize the present value of their wealth.

Mental accounting causes people to want to match the emotional costs and benefits of a purchase. Their determination frequently leads to expensive decisions. Consider the following example:⁷

Fifty-six MBA students were asked to select a loan to finance the \$7,000 cost of a home-remodeling project. The project involved redecorating (new carpet, wallpaper, paint, and so on) and would last four years, at which point they would have to redecorate again. Two borrowing options were given. One loan had a three-year term and an interest rate of 12 percent. The other was a 15-year loan with an 11 percent interest rate. Both loans could be prepaid without penalty.

Note that the long-term loan has a lower interest rate. In addition, the 15-year loan can be converted into a 3-year loan (that has a lower interest rate) by merely accelerating the payments. That is, you could calculate the monthly payment needed to pay off the 15-year loan in only 3 years. Because the interest rate on the 15-year loan is lower than on the 3-year loan, the monthly payments would be lower. When asked, 74 percent of the MBA students preferred the three-year loan. These students indicated a willingness to incur monetary costs (in the form of a higher interest rate) to make it easier to integrate related costs and benefits. The students were willing to pay a higher interest rate in order to guarantee that the loan will be paid in only three years. This is an example of the self-control problem discussed in [Chapter 11](#).

Another interesting example involves the well-known problem that people face

self-control challenges while saving money out of their paycheck. People are much more likely to save or invest money from a windfall than from regular income. This effect has been shown in windfalls like annual bonuses and tax refunds. Economists have traditionally argued that overpaying withholding tax every paycheck and then receiving a large tax refund is like giving the government an interest-free loan. However, many people like doing this because it causes a large windfall every year that they can save (at least partially). Saving an equivalent amount every paycheck is just too difficult. This is because people consider windfalls to be in their “wealth” mental account and paycheck income to be in their “consumption” mental account. It is hard for people to save (a wealth account) from a consumption mental account.

U.S. President Obama signed the recovery act stimulus bill on February 17, 2009. The bill was intended to stimulate an economy struggling with recession. One aspect of that bill was to reduce the tax withholding rates employers use to withhold employees’ income taxes. This change caused most people to see a small increase in their paycheck because fewer taxes were taken out. The overall income marginal tax rates were not changed, so the total amount of income taxes a person would owe did not change. Thus, this reduction in withholding simply allowed people to spend a little more each month (which would hopefully improve the economy), but that was offset by a smaller refund than expected the following year.

Could this change have an impact on people’s wealth? Would this cause people to save less the following year when they receive a lower tax refund than usual? Naomi Feldman conducted an analysis of a similar change in the withholding tables directed by President George H. W. Bush in 1992.⁸ She studied the saving contributions to an Individual Retirement Account (IRA). She found that every \$100 of taxes that were shifted from a refund to paychecks reduced the likelihood of IRA savings by 19.7 percent. The average shift in tax payments in 1992 was a \$24.42 monthly paycheck increase and a \$293 reduction in the 1993 tax refund. These results represent an average 57.6 percent decrease in the IRA participation rate. This effect is also likely to have been true for the 2009 change in withholding and the subsequent 2010 IRA participation rate. Because of mental accounting, the recovery act will likely decrease people’s savings and thus lower

their level of wealth.

[Can Money Make You Happy?](#) Can money make you happy? Of course it can! But does it? You can use behavioral finance concepts to spend your money in ways that increase your happiness. Here are four ways to spend your way to happiness:²

- (1) Buy experiences, not things.
- (2) Buy many small things instead of few big ones.
- (3) Pay now to consume later.
- (4) Help others.

Experiential purchases are those made with the purpose of gaining life experiences, like seeing leopards and lions on a safari in Africa. Material purchases are for acquiring nice things, like Brazilian cherry hardwood floors. Whether experiential or material in nature, we place each purchase in a mental account. However, we tend to adapt to the presence of our material things quickly and the cherry floors simply become the ground under our feet. However, revisiting the experiential mental accounts allows us to relive the experience and revive the happiness of the moment.

Prospect theory (from [Chapter 1](#)) tells us that we are happy when we make a profit of \$1,000. We are even happier when we make a profit of \$2,000, but we are not twice as happy! Indeed, we derive more pleasure from making a \$1,000 profit on each of two stocks than a \$2,000 profit on one stock. Spending money on pleasurable experiences seems to have a similar dynamic. For example, instead of buying the expensive 50-yard line seats at the football game, buy less expensive seats and then buy a new necktie, order an extra latte, and go to the zoo.

We live in a “buy now and pay later” society. The Internet and apps foster instantaneous purchase and immediate gratification behavior. Buying something right now certainly increases our happiness right now. But does it maximize our overall happiness? Recall from mental budgeting that we are happier enjoying an experience for which we have already paid relative to one that we will be paying for afterward. The mental pain of paying the bill afterward diminishes the

memory of the experience. In addition, the buy-it-now mantra can lead to regret from making purchases you might not have made given more time to consider them. However, saving in advance for the experience involves anticipation. Indeed, the pleasure of the anticipation can rival the enjoyment of the actual experience! Having a “pay first to play later” focus helps to counter the instant gratification mantra of modern society.

Lastly, spending money on others will make you happy. Humans are deeply and profoundly social (see [Chapter 9](#)). The quality of our social relationships is a strong determinant of happiness. Spending money on gifts for others or for charity tends to improve our pleasure. Giving to charity allows you to socially present yourself in a positive way and may even foster the development of more social relationships. This is why people prefer local donations over national ones. For example, it is more pleasurable to contribute to the American Cancer Society through the local Relay for Life event compared to a payroll deduction paid directly to the national organization.

Money can buy happiness if you spend it right!

► Mental Accounting and Investing

Investor Trading Decision makers tend to place each investment into a separate mental account. Each investment is treated separately, and interactions are overlooked. This mental process can adversely affect an investor's wealth in several ways. First, mental accounting exacerbates the disposition effect discussed in [Chapter 3](#). Recall that investors avoid selling stocks with losses because they do not want to experience the emotional pain of regret. Selling the losing stock closes the mental account, triggering regret.

Consider the wealth-maximizing strategy of conducting a *tax swap*.¹⁰ A tax swap occurs when an investor sells a stock with losses and purchases a similar stock. For example, suppose you own Delta Airlines stock, which has experienced a price decline along with the stocks of the entire airline industry. You could sell the Delta stock and purchase United Airlines stock. This tax swap allows you to capture the capital loss of Delta stock to reduce your taxes while staying invested and waiting for the airline industry rebound.

Why isn't the tax swap strategy used more often? Investors tend to consider the selling of the loser stock as a closing of that mental account and the buying of the similar stock as an opening of a new mental account. This causes two outcomes that affect investors. First, the interaction between these two accounts increases the investor's wealth. Second, the closing of the loser account causes regret. Investors tend to ignore the interaction between accounts; therefore, investors act to avoid regret instead of to maximize wealth.

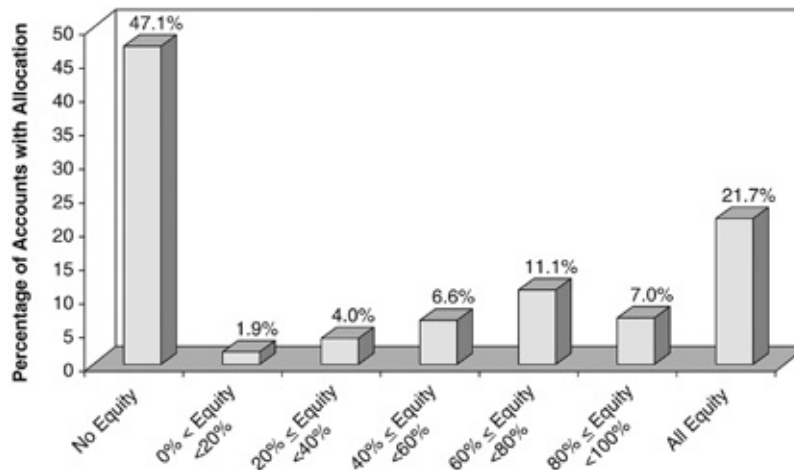
Mental budgeting compounds the aversion to selling losers. Consider how people value the timing of payments and benefits. As time passes, the purchase of the stock becomes a sunk cost. The emotional pain of wasting some of the sunk cost on a loser diminishes over time.¹¹ It may be less emotionally distressing for the investor to sell the losing stock later as opposed to earlier.

When investors do decide to sell a loser, they can bundle more than one sale on the same day. Investors can integrate the sale of losers to aggregate the losses and limit the feeling of regret to one time period. In other words, people may combine the separate mental accounts in losing positions and close them out all at once in order to minimize their regret. Instead of using the narrow frame of individual investments, they are able to broaden the frame to several investments. Alternatively, investors like to separate the sale of winners over several days to prolong the more favorable feeling. Sonya Lim studied the selling behavior of 50,000 brokerage accounts (425,000 sell trades) from 1991 to 1996.¹² She found that investors are likely to sell more than one losing stock on the same day. On the other hand, if a winner stock is sold, selling another winner stock on the same day is less likely. She concludes, “Investors can maximize their happiness by savoring gains one by one, while minimizing the pain by thinking about the overall loss rather than individual losses.” Can the sale with loss be integrated with the sale with a gain at the same time to mitigate the regret? It depends on the relative magnitudes of the loss and gain. Remember that prospect theory (from [Chapter 1](#)) states that the pain of a loss is greater than the happiness of a gain of the same magnitude. So, if the magnitude of the loss is larger than the magnitude of the gain, investors will segregate them by selling on different days. If the magnitude of the loss is smaller than the gain, then the investor may integrate them by selling on the same day.

In a follow-up study, Sonya Lim and Alok Kumar investigated whether those investors who can think of their investments in a broader frame suffer less from other behavioral problems.¹³ Specifically, a narrow framing viewpoint may exacerbate the disposition effect and also cause poor diversification. Clustering trades indicates a broader frame. They find that investors exhibiting a broader frame also exhibit weaker disposition effects and hold better-diversified portfolios.

[Asset Allocation](#) The narrow framing aspect of mental accounting might also explain why so many people do not invest in the stock market,¹⁴ even though stocks have a high mean return. The stock market risk has nearly zero correlation with a person’s other economic risk, namely, labor income risk and housing price

risk. Therefore, adding even a small amount of stock market risk provides diversification of one's overall economic risk. However, in isolation, which is how people tend to view things, the stock market appears much riskier than labor income risk and housing price risk.



[Figure 6.1](#) Retirement Plan Allocation to Equities

As an example, consider the distribution of asset allocation within 401(k) retirement plans. A study of nearly 7,000 accounts from one large firm found the allocations to be strongly bimodal.¹⁵ [Figure 6.1](#) shows that about 47 percent of the participants do not allocate any money to equities. Another 22 percent allocate all of their money to equities. In all, 69 percent of the accounts were completely undiversified among asset classes. These allocations seem more consistent with mental accounting than with decision making from a portfolio perspective.

Also, mental accounting tends to cause investors to make decisions about one of their investment accounts without considering their other accounts. That is, instead of creating a total asset allocation of their complete portfolio, they consider each account separately. By narrowly framing each account, they may find that the total asset allocation becomes unattractive. Consider that the typical 401(k) plan has employees make allocation decisions for their own contribution. But, the asset allocation of the matching contribution by the firm is usually made by the firm, not the employee. Does the employee consider the predetermined allocation of the matching contribution when deciding the allocation of their own contribution? Analysis of one firm's change in their 401(k) plan illustrates that

employees do not take into account the matching allocation.¹⁶ Before the policy change, employees chose only their own contribution's allocation. The matching contribution was entirely in employer stock. After the change in March 2003, the employees chose the asset allocation for both their own and the matching contributions.

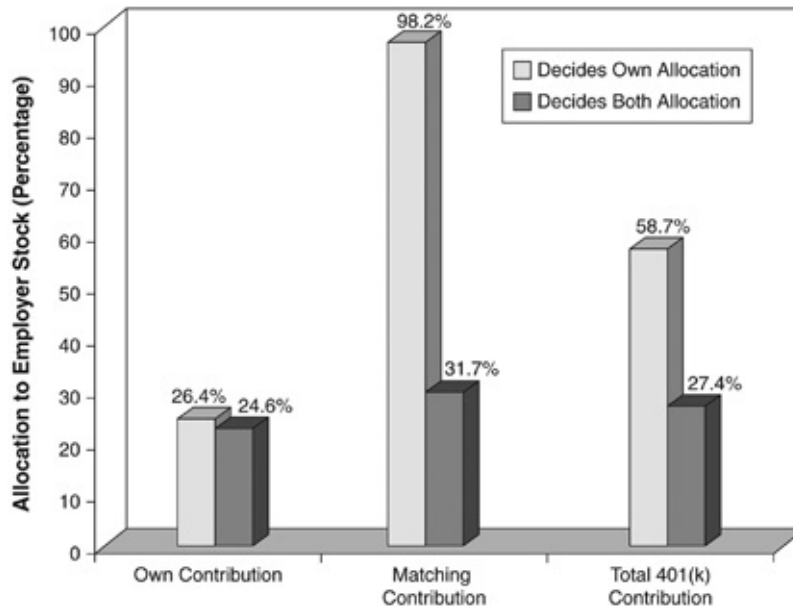


Figure 6.2 Allocation to Employer Stock When Employees Decide

[Figure 6.2](#) shows the contributions to employer stock. During the six months before this policy change, new employees decided only the allocation of their own contributions. They selected an average 25 percent of their own contributions to employer stock, while the match was entirely of employer stock. Thus, the total retirement plan allocation—both their own and the matching contributions—was nearly 60 percent in employer stock. During the six months after the policy change, new employees allocated about 25 percent of their own contributions and about one-third of the matching contribution to employer stock. This allocation made the total retirement plan allocation to employer stock about 27 percent. Notice that this is less than half of the allocation made in the pre-change period. If participants wanted only 27 percent of their total assets allocated to employer stock, then they should have allocated none of their contributions to employer stock when the match was pre-determined into employer stock. Yet, the allocation of their own contributions was almost the

same between the two periods. The allocation of the matching account did not seem to impact their allocations in their own accounts!

Mental accounting also affects investors' perceptions of portfolio risks. The tendency to overlook the interaction between investments causes investors to misperceive the risk of adding a security to an existing portfolio. [Chapter 7](#) describes how mental accounting leads to the building of portfolios layer by layer. Each layer represents the investment choices that satisfy various mental accounts. This process allows investors to meet the goals of each mental account separately. It does not lead to the benefits of diversification shown by portfolio theory. In fact, people usually don't think in terms of portfolio risk. Consider a financial advisor suggesting to his or her clients that they should take a little more investment risk to acquire more money for retirement. If asked, would you prefer to take a *lot* more risk with *some* of your money, or would you prefer to take a *little* more risk with *all* of your money?¹⁷ People tend to think in terms of the first choice, which is consistent with mental accounting. The second choice is from the perspective of modern portfolio theory.

Market Impact Mental accounting sets the foundation for segregating different investments in separate accounts, each to be considered alone. A reference point in each mental account determines whether the current position is considered a gain or a loss. This mental accounting then allows for the application of other psychological biases, like the disposition effect (see [Chapter 3](#)). Remember that the disposition effect influences investors to sell winners quickly and hold on to losers. Can this combination of mental accounting and disposition effect behavior of individual investors somehow impact stock prices?

If many investors have unrealized capital gains and unrealized capital losses in the same stocks, then their biased trading may distort the stock prices of those firms. Mark Grinblatt and Bing Han argued that a stock that has had good news in the past and increased in price will also have excess selling pressure because of the disposition to sell winners.¹⁸ This selling keeps the winner stock price below fundamental value. Alternatively, a stock with prior adverse news experiences a price decline. However, disposition investors hold losers and this lack of selling keeps the stock price above its fundamental value. They conclude, "In

equilibrium, past winners tend to be undervalued and past losers tend to be overvalued” (p. 314). If past winners are under-valued, then they are likely to continue to perform well in the future. Overvalued losers should continue to perform poorly. This pattern is known as stock return *momentum*. Grinblatt and Han claim that the momentum pattern is caused by investors suffering from mental accounting and the disposition account. To illustrate this point, they estimated the amount of unrealized capital gains (and losses) in each stock with a procedure that combines past prices and volume to compute an aggregate cost basis. This cost basis is the reference point used to determine the unrealized capital gain or loss status. Stocks with high estimated unrealized gains outperform stocks with high unrealized losses by 10 percent per year. After controlling for unrealized capital gains and losses, past returns no longer predict future returns. They suggest that what has been known as momentum in returns is really a ramification of mental accounting and the disposition effect. Stocks with paper capital gains will have higher average returns in the future than stocks with paper losses.

► Summary

The process of mental accounting leads people to think about each of their investments in isolation. Therefore, people do not think about any benefits or costs associated with the interaction between investments, like diversification and tax swaps. This narrow framing leads to poor asset allocation and too much allocation into an employer's stock. Mental accounting exacerbates the disposition effect. When this is pervasive in society, past winners can be undervalued and past losers can be overvalued, leading to a momentum pattern in the market. Lastly, money can make you happier, if you spend it right.

► Questions

1. Why do people save money in advance for a vacation but tend to finance a consumer purchase and pay later? What are the factors involved?
2. Why do investors tend to sell losing positions together, on the same day, and separate the sale of winning positions over several days?
3. How does the use of a tax swap overcome some psychological biases?
4. How can changes in tax withholding rates impact people's wealth?
5. Explain how mental accounting combines with the disposition effect to impact stock prices.

► Notes

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- [2](#) Chelsea Helion and Thomas Gilovich, “Gift Cards and Mental Accounting: Green-lighting Hedonic Spending,” *Journal of Behavioral Decision Making* 27 (2014): 386–393.
- [3](#) Drazen Prelec and George Loewenstein, “The Red and the Black: Mental Accounting of Savings and Debt,” *Marketing Science* 17 (1998): 4–28.
- [4](#) Richard Thaler, “Toward a Positive Theory of Consumer Choice,” *Journal of Economics Behavior and Organization* 1 (March 1980): 39–60.
- [5](#) From Hal Arkes and Catherine Blumer, “The Psychology of Sunk Cost,” *Organizational Behavior and Human Decision Processes* 35 (February 1985): 124–140.
- [6](#) This discussion is adapted from John Gourville and Dilip Soman, “Payment Depreciation: The Behavioral Effects of Temporally Separating Payments From Consumption,” *Journal of Consumer Research* 25 (1998): 160–174.
- [7](#) Eric Hirst, Edward Joyce, and Michael Schadewald, “Mental Accounting and Outcome Contiguity in Consumer-Borrowing Decisions,” *Organizational Behavior and Human Decision Processes* 58 (1994): 136–152.
- [8](#) See Naomi E. Feldman, “Mental Accounting Effects of Income Tax Shifting,” *Review of Economics and Statistics* 92 (2010): 70–86.
- [9](#) These are adapted from Elizabeth W. Dunn, Daniel T. Gilbert, and Timothy D. Wilson, “If Money Doesn’t Make You Happy, Then You Probably Aren’t Spending It Right,” *Journal of Consumer Psychology* 21 (2011): 115–125.
- [10](#) This discussion is adapted from Hersh Shefrin and Meir Statman, “The Disposition to Sell Winners Too Early and Ride Losers Too Long: Theory and Evidence,” *Journal of Finance* 40 (1984): 777–790.
- [11](#) John Gourville and Dilip Soman, “Payment Depreciation: The Behavioral Effects of Temporally Separating Payments From Consumption,” *Journal of Consumer Research* 25 (1998): 160–174.

- [12](#) Sonya Seongyeon Lim, “Do Investors Integrate Losses and Segregate Gains? Mental Accounting and Investor Trading Decisions,” *Journal of Business* 79 (2006): 2539–2573.
- [13](#) Alok Kumar and Sonya Seongyeon Lim, “How Do Decision Frames Influence the Stock Investment Choices of Individual Investors?” *Management Science* 54 (2008): 1052–1064.
- [14](#) Nicholas Barberis, Ming Huang, and Richard Thaler, “Individual Preferences, Monetary Gambles, and Stock Market Participation: A Case for Narrow Framing,” *American Economic Review* 96 (2006): 1069–1090.
- [15](#) Julie Agnew, Pierluigi Balduzzi, and Annika Sundén, “Portfolio Choice and Trading in a Large 401(k) Plan,” *American Economic Review* 93 (2003): 193–215.
- [16](#) James Choi, David Laibson, and Brigitte Madrian, “Mental Accounting in Portfolio Choice: Evidence From a Flypaper Effect,” *American Economic* 99 (2009): 2085–2095.
- [17](#) Meir Statman, “The Diversification Puzzle,” *Financial Analysts Journal* 60 (2004): 44–53.
- [18](#) Mark Grinblatt and Bing Han, “Prospect Theory, Mental Accounting, and Momentum,” *Journal of Financial Economics* 78 (2005): 311–339.

Forming Portfolios

[Chapter 6](#) detailed how mental accounting is used to track the costs and benefits associated with each decision. Mental accounting also affects how you view your investment portfolios.

► Modern Portfolio Theory

Sixty years ago, Nobel Prize–winning economist Harry Markowitz taught us to consider all our investments as one whole portfolio. According to Markowitz, an investor should consider owning the investments that combine to form a portfolio that offers the highest expected return for the level of risk desired. Combining investments into a portfolio requires the investor to think in terms of diversification. Investors like the idea of diversification. However, they implement diversification differently than Markowitz’s portfolio theory suggests.

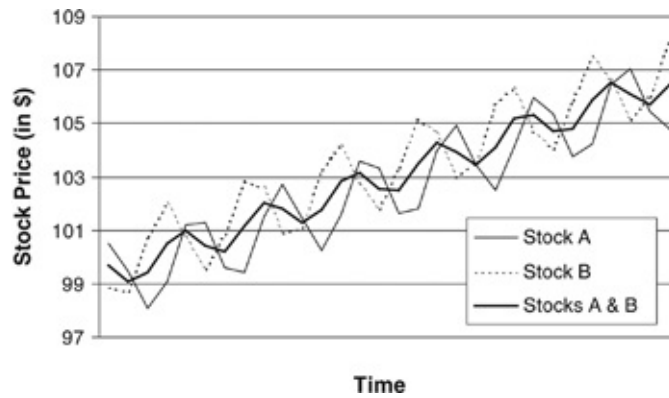
To implement portfolio theory, you must consider three important characteristics of each potential investment. The first two parameters are the expected return and the level of risk (as measured by standard deviation of returns) of the investments. Examining the risk and return makes sense to investors. The third important characteristic is the correlation between the returns of each investment. Correlation is how each investment interacts with the others. Mental accounting makes it difficult to implement this important characteristic.

► Mental Accounting and Portfolios

Investors typically place each investment into a separate mental account. One outcome of mental accounting is that you discount the interaction between mental accounts, which affects the construction of your portfolio. Consider the high volatility of the recent stock market. Stocks often experience large price gains and losses each day. Modern portfolio theory shows that different investments can be combined to reduce this volatility. By comparing how the price of different investments changes over time, a lower-risk portfolio can be constructed.¹

For example, stocks A and B in [Figure 7.1](#) have approximately the same return and variation in stock price over time. Both stocks experience large price changes. However, notice that when stock A is advancing, stock B is often declining. Because stocks A and B frequently move in opposite directions, buying both stocks creates a portfolio with reduced risk. That is, the value of your portfolio varies less over time when you own stocks A and B than it would if you owned only one of those stocks.

However, creating a portfolio that reduces risk (in the modern portfolio theory sense) means considering the interaction between different investments. Unfortunately, investors often treat each investment as a different mental account and tend to ignore the interaction between those mental accounts. Therefore, the most useful tool in constructing portfolios and reducing risk, the correlation between investments, is difficult to utilize because of mental accounting.



[Figure 7.1](#) Combining Stocks into a Portfolio

Instead, portfolios are built by making buying decisions on each investment individually. In general, investors tend to pick investments as if they were picking food at a buffet: “This looks interesting...I think I’ll have some of that...maybe a little of this one...I’ve heard about that one...” The decision to purchase a new security and open a new mental account does not include the investment’s correlation with other investments because the mental accounts do not interact with each other.

► Perceptions on Risk

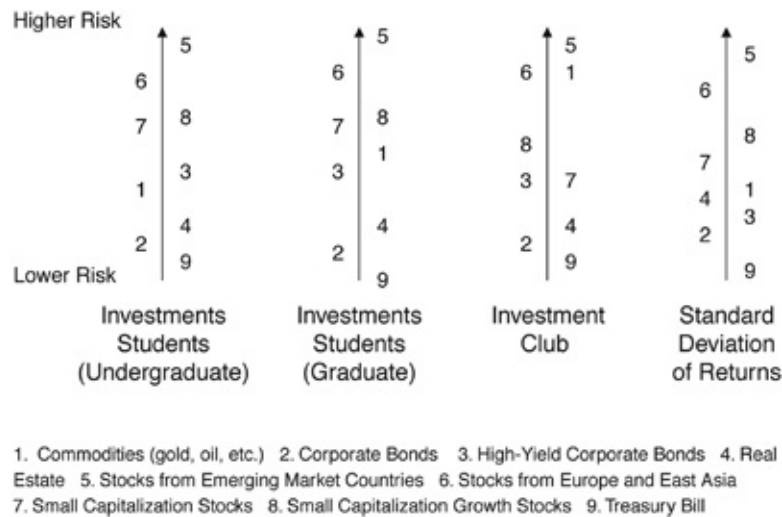
Viewing each investment as a separate mental account causes investors to misperceive risk. Investors evaluate each potential investment as if it were the only investment they will own. However, most investors already have a portfolio and are considering other investments to add to it. Therefore, the most important consideration for the evaluation is how the expected risk and return of the portfolio will change when a new investment is added. In other words, it is how the new investment interacts with the existing portfolio that matters. Unfortunately, people have trouble evaluating the interactions between mental accounts. Consider the following problem:

You have a diversified portfolio of large domestic and international stocks with some fixed-income securities. You are examining the following investments: commodities, corporate bonds (high grade), emerging markets stocks, European and East Asian stocks, high-yield bonds, real estate, Russell 2000 Growth Index, small capitalization stocks, and Treasury bills. How does the addition of each investment change the risk of the existing portfolio?

I asked 45 undergraduate and 27 graduate students taking the investments course and 16 investment club participants to sort these 9 investments by their level of risk contribution to the portfolio. Note that the experiment participants were not given return, risk, or correlation information. They had to make decisions based on their own knowledge and information. [Figure 7.2](#) reports the results of the three groups.

Treasury bills and corporate bonds are viewed as adding the least risk, whereas real estate, commodities, and high-yield bonds add higher risk. Small capitalization stocks and foreign stocks add the most risk to the portfolio. Notice that all three groups provide a similar ranking of how each investment contributes risk to the existing portfolio. The last ranking in the figure was calculated using the investments' standard deviation of monthly returns during 1980–1997.² Standard deviation is a good measure of an investment's risk. The rank order and magnitude of risk contribution of the three different groups is

similar to the risk ranking using standard deviation as the measure.



[Figure 7.2](#) Investor's View of Risk Contribution to Portfolio

However, standard deviation measures the riskiness of the investment, not how the risk of the portfolio would change if the investment were added. Remember the earlier example where stocks A and B had the same risk but combined to reduce risk in a portfolio? It is not the level of risk for each investment that is important; the important measure is how each investment interacts with the existing portfolio. Consider [Figure 7.3A](#).

Panel A of the figure plots the standard deviation of monthly stock returns for each investment versus the investment's contribution of risk to the existing portfolio, as measured by beta. A beta of greater than 1 indicates that the investment would increase the risk of the portfolio. A beta smaller than 1 indicates that adding the security would reduce the risk of the portfolio.

Notice that the last risk ranking in [Figure 7.2](#) is simply the y-axis of [Figure 7.3A](#). Because of mental accounting, investors view the risk of adding an investment to their portfolio as the individual risk (standard deviation) of the investment. However, the real contribution to portfolio risk of the investment is measured on the x-axis. [Figure 7.3B](#) shows just the x-axis—the interaction between the investment and the existing portfolio.

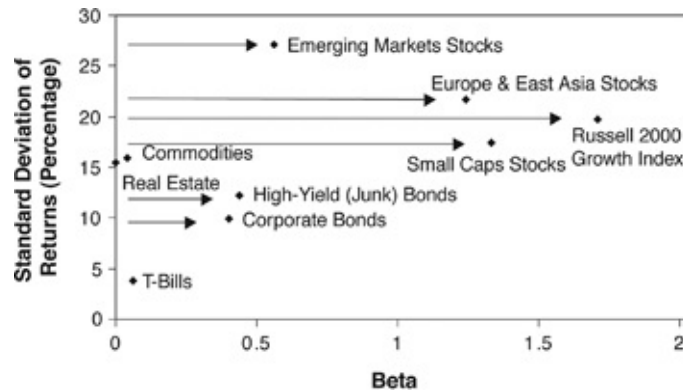


Figure 7.3A Investment Risk and Risk Contribution to Portfolio

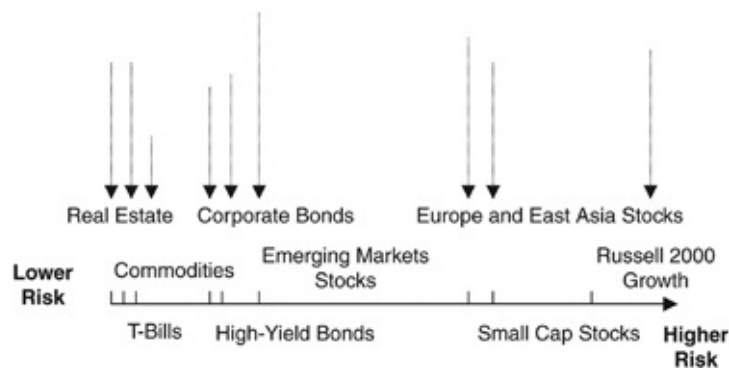


Figure 7.3B Change in Portfolio Risk After Adding the Investment

Panel B shows that if you want to reduce the risk of your portfolio, you should add real estate and commodities. Does this come as a surprise? Small capitalization stocks and Russell 2000 Growth Index-type stocks increase the risk of the portfolio. Viewed by themselves, emerging markets stocks are the most risky investments in the example. However, they would interact with the existing portfolio such that they would reduce the risk of the portfolio, if they were added.

Risk Perception in the Real World Public pension systems demonstrate how the misperception of risk from mental accounting affects portfolios. Public pension systems are the retirement plans of public employees such as teachers, police, and state and city workers. The state or local government sets aside money each year to be invested and ultimately used as the employees' retirement income. Professional money managers are hired to invest the money, but the government may restrict the managers from investing in specific securities in an attempt to limit the risk of the portfolio. Because of mental accounting, the government

officials tend to use each security's individual risk (as in [Figure 7.3A](#)) instead of the interaction risk effect (as in [Figure 7.3B](#)) to make these decisions.

The Government Finance Officers Association surveyed public pension plans in 1999. The plan managers were asked about the investment restrictions under which they operate. A total of 211 retirement plan managers responded.³ Remember that [Figure 7.3B](#) showed that real estate, corporate bonds, and even foreign stocks can reduce the risk of a typical portfolio. However, 14 plan managers responded that they could not invest in real estate. A total of 8 plan managers could not invest in corporate bonds, and 19 plan managers could not invest in foreign securities. Many more plans had other limitations, such as a maximum investment in real estate, corporate bonds, and foreign securities of no more than 5 percent of the portfolio. Interestingly, three plan managers could not invest in U.S. stocks at all. Those government policymakers need to read this book!

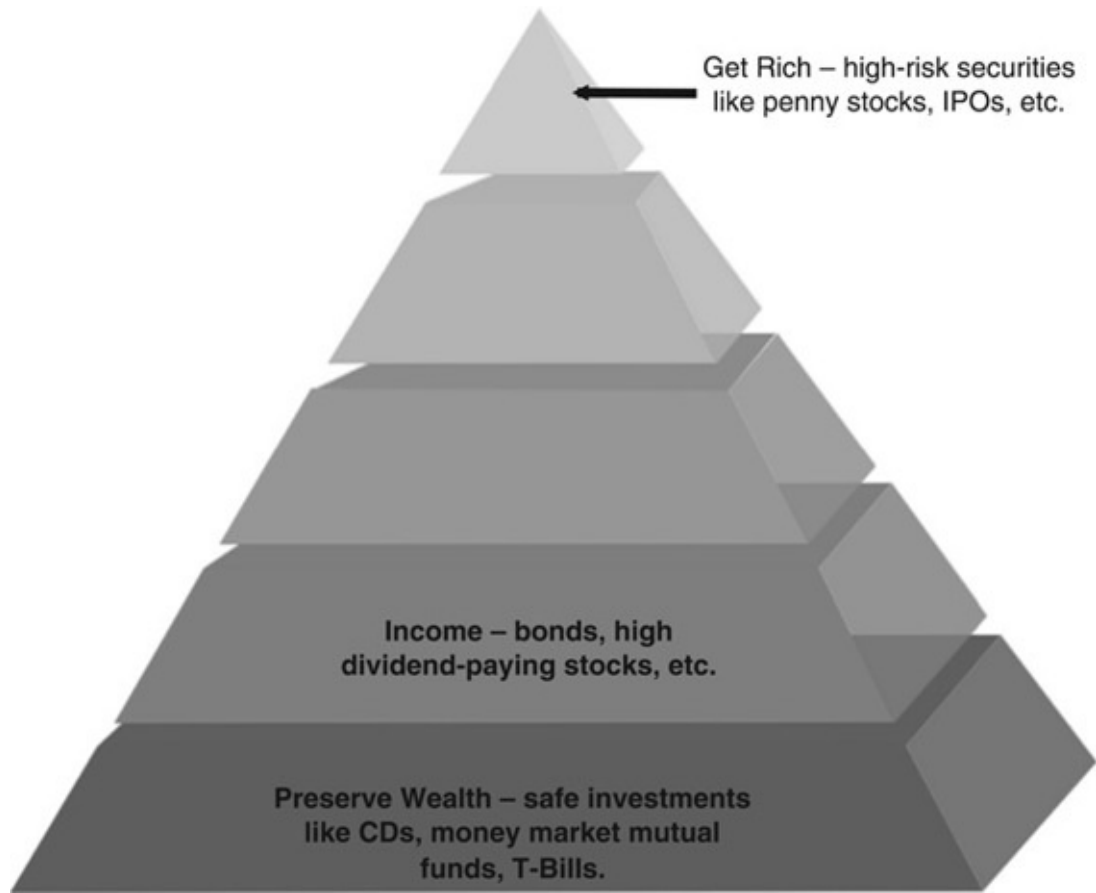
► Building Behavioral Portfolios

Investors like the idea of diversification, but they don't build portfolios in the manner suggested by portfolio theory. How, then, do investors build a diversified portfolio?

Hersh Shefrin and Meir Statman show how the psychological tendencies of investors cause them to think of their portfolios as a pyramid of assets.⁴ Each layer in the pyramid represents assets intended to meet a particular goal. Consider the pyramid depicted in [Figure 7.4](#).

People have separate mental accounts for each investment goal, and the investor is willing to take different levels of risk for each goal. Investments are selected for each mental account by finding assets that match the expected risk and return of the mental account.

First, investors have a goal of safety. Therefore, they allocate enough assets in the safest layer (the bottom of the pyramid), as required by their mental accounts. Then mental accounts with higher levels of expected return and risk tolerance allocate assets to appropriate investments in another layer. For example, retired investors need investment income. The income goal is met in a layer of the pyramid with assets invested in bonds and stocks that pay high dividends. After the income goal is met, the retiree's next goal might be to keep up with inflation. This investor would then have a set of assets in a layer that invests for growth.



[Figure 7.4](#) Pyramid Depicting Behavioral Portfolio

Each mental account has an amount of money designated for that particular goal. It is the number of mental accounts requiring safety that determines the amount of money placed in safe investments. In contrast, some mental accounts designate “get-rich” assets. In sum, the total asset allocation of an investor’s portfolio is determined by how much money is designated for each asset class by the mental accounts. Investors without many safety-oriented goals will place greater amounts of money in high-risk securities. Investors who have stronger safety or income goals will have more securities in those layers of the pyramid.

Consider the average investor. The average investor has assets in a 401(k) pension plan that seems well diversified to the employee (but see the next two sections). Because the 401(k) plan matches the retirement income goals of the person, the next level of the pyramid might be to achieve a higher standard of living in retirement or to save for a child’s college education. Mutual fund investments fit

this goal nicely.

Higher up the pyramid, a person may want to become rich. A discount brokerage account can be used to try to meet this goal. The median number of stocks owned in a brokerage account is only three,⁵ and the median investor trades about three times per year. This low level of diversification might be a problem if it represents a significant portion of the investor's wealth. In addition, investors may sometimes use the stock market to gamble. Alok Kumar identifies stocks with lottery features and finds that people who have a propensity to gamble are also more likely to buy these stocks.⁶ Just like the lottery, these lottery-type stocks underperform, but provide a small chance for a big profit. In addition, Abhishek Varma and I examine ownership and trading in over-the-counter stocks, sometimes called penny stocks.⁷ We find that investors typically own both safe assets and trade in penny stocks. There is no evidence that the investors have private information about these stocks; alternatively, their trading is consistent with sensation seeking in a layer of their behavioral portfolio.

The result of these various goals and mental accounts is that the average investor ends up with a variety of mini-portfolios. The make-up of the overall portfolio is determined, formed, and changed because of the distribution of investment goals and associated mental accounts.⁸ Investors tend to overlook the interaction among mental accounts and among investment assets. As a result, investor diversification comes from investment goal diversification rather than from a purposeful asset diversification, as described in Markowitz's portfolio theory.

Ultimately, this means that most investors do not have efficient portfolios. As a consequence, investors are taking too much risk for the level of expected return they are getting. Stated another way, investors could obtain higher returns for the level of risk they are taking.

Household Portfolios Investor behavior has been examined using detailed datasets of brokerage or retirement plan accounts. However, the diversification used by households may be best studied by examining the entire portfolio of household financial assets. Every 3 years, the Federal Reserve Board conducts the Survey of Consumer Finances (SCF) by interviewing around 4,000 households

about their financial assets.

Valery Polkovnichenko examined diversification by households using the SCF surveys from 1983 to 2001.⁹ He finds many behaviors that are consistent with people having preferences for separating investment assets to align with separate goals. For example, each household exhibits both risk-aversion and risk-seeking behavior at the same time. They invest both in diversified portfolios like mutual funds and in undiversified stock portfolios with few individual stocks. Consider the households with between \$100,000 and \$1 million in financial asset wealth. Over the years, 10–15 percent of these households own no stocks (either directly or indirectly through funds). Of those households with stock market ownership, the median household has 15 percent of its financial wealth in a stock portfolio consisting of only four stocks! This median household also has 49 percent of its financial wealth in diversified stock portfolios through mutual funds and pension plans.

Note how this behavior is consistent with investing for two different layers of the behavioral pyramid. A diversified equity portfolio is ideal for achieving moderate riches for retirement. It is not appropriate for achieving great riches. After all, we know that we will not earn a 1,000 percent return in a couple of years through a diversified portfolio. Aspirations like this require an investment in an undiversified portfolio or lottery tickets, no matter how unlikely their success. The investment in four stocks is consistent with the desire for a long-shot gamble at getting rich.

Preferred Risk Habitat People try to match their level of risk aversion to their investments. However, they do not appear to match their preferred risk level to the risk of their total portfolio. Instead, they tend to use their desired risk level to help them pick each of the individual components that make up the portfolio. That is, investors break up the complex portfolio creation decision into simpler subproblems of finding portfolio components. Each component matches the investor's preferred risk level.

Consider this illustration. Say that an investor decides that his level of risk aversion is such that it matches an investment volatility (standard deviation) of

50 percent. His investment opportunity set includes stocks with increasing levels of risk measured as volatilities of 20, 30, 40, 50, 60, 70, and 80 percent. How does he match his investments to his risk level? One possibility is that if he narrowly frames each stock individually, he could allocate half of the portfolio to the lowest risk stock (of 20 percent volatility) and half to the highest risk stock (of 80 percent volatility) and have a portfolio with average volatility of 50 percent the desired level. A second possibility is that he could allocate to the middle volatility stocks (40, 50, and 60 percent) to form the desired average risk level. A third option would be to take the modern portfolio approach and view the stocks from a broader frame. Combining the stocks might create diversification effects that would lower the total portfolio risk. So he could pick the riskier stocks (60, 70, and 80 percent volatility) and create a total portfolio volatility of the desired 50 percent.

Which of these three options describe investor behavior? Dan Dorn and Gur Huberman argue that investors tend to behave like the second option.¹⁰ They select a level of risk and then pick individual stocks, all with that risk profile. By examining over 20,000 clients at a German broker, they find that investors tend to pick a preferred risk habitat and then pick from the stocks in that habitat. When they replace a stock in their portfolio, they buy a new stock that is in the same risk habitat as the one sold. Lastly, they find that those investors who are most prone to specializing in a risk habitat underperform other investors because they take too much diversifiable risk. They would be better off thinking more broadly and designing a diversified portfolio with total risk that matches the risk habitat.

► Naïve Diversification

Although investors should consider their entire portfolio when making investment decisions, they usually make decisions only within the narrow context of the situation. For example, consider investing for your retirement. Some of your assets will be in retirement plans, such as IRAs and 401(k) plans, and other assets will not be. Suppose the most efficient portfolio for you includes 50 percent stocks and 50 percent bonds. You probably will put half of your retirement plan money in stocks and half in bonds. You will do the same with the assets outside the retirement plans. However, this is not the best allocation. The reason is that you have to pay taxes on income from assets outside the retirement plans, such as from your bonds.

The better choice would be to invest the money within the retirement plans in bonds and buy the stocks with the assets outside the retirement plans. The overall portfolio would still be a mix of 50 percent stocks and 50 percent bonds, but you would owe less in taxes every year. However, this allocation is hard for investors because the conservative allocation of bonds in the retirement plans does not match their investing goals as indicated by the retirement mental account.

Because many participants in a defined contribution retirement plan are unsure of how to design an appropriate portfolio, a pre-determined fund has recently become a popular offering. These funds are called either target-date funds or life-cycle funds. The idea is that the investor can select the appropriate fund to match when he or she plans to retire, say the year 2035. The target date 2035 fund may have a 50 percent allocation to stocks now, but that will decline over time as the retirement date approaches. The fund adjusts to the life-cycle risks of the investor as the investor ages. For participants who do not want to fret over the initial allocation choices and the ongoing rebalancing of the 401(k) plan, this is an ideal option. In most cases, the participant who chooses the life-cycle fund should allocate all of his or her retirement assets to it. Yet, that is not how these funds

are being used. In pension plans using Vanguard funds, William Nessmith and Stephen Utkus found that only about half of the people contributing to the target-date fund do so exclusively.¹¹ The other half of the people often contribute to three, four, or more other choices. Indeed, those investors choosing a life-cycle fund in combination with other funds tend to contribute less than half of their retirement money to it. It is interesting to note that usually investors are underdiversified, but when given a chance to invest in a fully diversified portfolio created with their age in mind, they choose to put only some of their money in it.

Retirement Plans The 401(k) retirement plan is a good example of investor mental accounting and naïve diversification. Employers offer different investment choices within 401(k) plans. For example, one plan may have one bond fund and three stock funds to choose from, and another plan may have one bond fund and one stock fund. Which investments do employees choose?

Employees have a tendency to diversify their 401(k) investments by using a $1/n$ rule. The old adage says that we should “never put all our eggs in one basket.” But the adage doesn’t give us any direction on how to distribute our eggs. Should we divide them evenly between baskets? If three 401(k) choices are available, should we allocate one-third to each of the three choices?

Interestingly, this occurs no matter what the choices are. For example, the plan offered to TWA pilots had five stocks funds and one bond fund. If all pilots used the $1/n$ rule, then we would expect 83 percent ($5/6$) of the average portfolio to be invested in stocks. Indeed, the TWA pilots invested an average of 75 percent in stocks, which was much higher than the 57 percent national average. Alternatively, University of California (UC) employees were offered one stock fund and four bond funds. The average stock holdings for UC employees amounted to only 34 percent. Indeed, the number and type of investment offerings seem to play an important role in the asset allocation of employees. At least some employees appear to use the naïve diversification rule of $1/n$.¹² When many choices are available, employees tend to pick just three or four of them and then allocate their contribution evenly between them.¹³

Two scholars, Guido Baltussen and Gerrit Post, examine people’s process for

choosing investments within a controlled experiment.¹⁴ They use financially trained subjects and real money, having them pick from three (or four) investment choices with clearly shown risk and return characteristics. They find that a large majority appear to first narrowly frame each potential investment and determine if the risk/return characteristics are acceptable or not. Of the set that are viewed acceptable, most of the subjects divided their money evenly between them. This behavior persisted even when the experiment included a choice that might have looked inferior in isolation, but would have created great diversification benefits if combined with the other choices. Unfortunately, the subjects eliminated that portfolio before allocating their funds. They call this behavior the *conditional 1/n heuristic*. That is, people use the 1/n rule conditionally after first eliminating some alternatives. Another study using the Australian compulsory retirement saving program known as superannuation expands these ideas.¹⁵ The authors find that greater investment experience is associated with using more funds. That is, employees with more investment experience choose a larger n . Additionally, they find that when selecting their investment funds, people reduced the number of funds (n) when the market was increasing. Therefore, the representativeness bias of the next chapter may impact the narrow framing of investment choices.

Another example is the mental accounting of company stock in the 401(k) plan. Employees appear to treat the stock of the company they work for as different from other stocks. A 1995 survey by John Hancock Financial Services found that a majority of employees believe their own company stock is safer than a diversified portfolio. Interestingly, years after Enron showed us how risky it is to invest in your employer's stock, more than 50 percent of assets in many large corporate 401(k) plans are still invested in company stock.¹⁶ Indeed, 5 million people have more than 60 percent of their account balance investment in their employer's stock.

Company stock is frequently one of the 401(k) choices for employees. In a study of 170 different corporate 401(k) plans, Shlomo Benartzi and Richard Thaler found that 103 plans include company stock as an option. Of the 67 plans that did not include company stock, employees allocated 49.2 percent of their assets to

stocks. This nearly 50–50 split is common. However, employees who have the company stock as an option have an average of 42 percent of their assets in the company stock. If they also want a 50–50 split between stocks and bonds, then they should invest most of the rest of their assets in bonds. However, they do not do this. Instead, they split the rest of their assets 50–50 between stocks and bonds. In this way, employees in plans with company stock end up having an average of 71 percent of their portfolio in stocks. These investors appear to put their company stock into its own mental account that is not associated with other stocks.

► Summary

The tools of traditional finance, like modern portfolio theory, can help investors establish efficient portfolios to maximize their wealth with acceptable levels of risk. However, mental accounting makes it difficult to implement these tools. Instead, investors use mental accounting to match different investing goals to different asset allocations. This often leads to investors diversifying their portfolios by goal rather than in total. When investors pick investments in each goal-focused mini portfolio, they examine each choice's individual risk and return characteristics and ignore their diversification characteristics. They eliminate the choices they view as inferior and then often simply divide their money equally among the acceptable choices.

Even investors who overcome their tendency toward mental accounting and implement modern portfolio efficiency in their portfolios often find themselves second-guessing over time. The concept of integrating asset classes that exhibit a low correlation means that one or more asset classes held probably will be performing poorly at any given time. Even investors who believe in the diversification argument find themselves wanting out of the underperforming asset class in their portfolios.

► Questions

1. How does mental accounting make the concept of correlation difficult for investors to implement?
2. Consider a family of 40-something parents and teenage children. If the family forms its portfolio through a behavioral process, what might it look like? Compare it with what a portfolio would look like if formed on modern portfolio theory principles.
3. Describe the stocks in an investor's portfolio when he picks from a preferred risk habitat. Give specific examples. How is this likely to impact the diversification of the portfolio?
4. How does the number of investment choices tend to affect the allocation in an employee's 401(k) plan?
5. If an investor is choosing among four investment choices (a small firm fund, an S&P 500 Index fund, a technology stock fund, and a bond fund), how would the final asset allocation differ between using the $1/n$ rule versus the conditional $1/n$ heuristic?

► Notes

- [1](#) Roger G. Clarke, Scott Krase, and Meir Statman, “Tracking Errors, Regret, and Tactical Asset Allocation,” *Journal of Portfolio Management* 20 (1994): 16–24.
- [2](#) Data for these figures come from table 3.7 (p. 93) of Frank K. Reilly and Keith C. Brown, *Investment Analysis and Portfolio Management* (Fort Worth: Dryden Press, Harcourt College Publishers, 2000).
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Representativeness and Familiarity

Psychological research has shown that the brain uses shortcuts to reduce the complexity of analyzing information. Psychologists call these heuristic simplifications. These mental shortcuts allow the brain to generate an estimate of an answer before fully digesting all the available information. Two examples of shortcuts are known as representativeness and familiarity. Using these shortcuts allows the brain to organize and quickly process large amounts of information. However, these shortcuts also make it hard for investors to analyze new information correctly and can lead to inaccurate conclusions.

► Representativeness

The brain makes the assumption that things that share similar qualities are quite alike. Representativeness is judgment based on stereotypes. Consider the following question:

Mary is quiet, studious, and concerned with social issues. While an undergraduate at Berkeley, she majored in English literature and environmental studies. Given this information, indicate which of the following three cases is most probable:

- A. *Mary is a librarian.*
- B. *Mary is a librarian and a member of the Sierra Club.*
- C. *Mary works in the banking industry.*

I have asked this question to undergraduate investment students, MBA graduate students, and financial advisors. In all three groups, more than half of the people choose case B—Mary is a librarian and a member of the Sierra Club. People select this case because being a librarian and a member of the Sierra Club is representative of the type of career a studious person concerned with social issues might pick. However, the question asked which case is more probable, not which case would make Mary the happiest.

Case A—Mary is a librarian—is a superior choice to B. Being a librarian and a Sierra Club member is a subset of being a librarian. Because case A includes case B, it is more probable that case A is true. Usually, a quarter to a third of the people asked understand this and choose case A over case B.

However, the best choice is case C—Mary works in the banking industry. Many more people are employed by banks than by libraries. In fact, so many more jobs exist in banking that it is far more probable that someone works in the banking industry than as a librarian. Because working in the banking industry is not “representative” of the shortcut our brains make to describe Mary, few people pick case C.

► Representativeness and Investing

People also make representativeness errors in financial markets. For example, investors confuse a good company with a good investment. Good companies are represented by firms that generate strong earnings, have high sales growth, and have quality management. Or, you may believe a company is good because you like its products or the way it treats its employees. Good investments are stocks that increase in price more than other stocks. Are the stocks of good companies also good investments? The answer might be no.¹

Classifying good stocks as firms with a history of consistent earnings growth ignores the fact that few companies can sustain the high levels of growth achieved in the past. The popularity of these firms drives prices higher. However, over time, it becomes apparent that investors have been too optimistic in predicting future growth, and the stock price falls. This is known as *overreaction*.²

Three financial economists examined this issue. Josef Lakonishok, Andrei Shleifer, and Robert Vishny (henceforth LSV) studied the performance of stocks investors typically consider to be growth stocks. These researchers label growth stocks as “glamour” stocks. Stocks of firms that investors typically consider to be bad firms with minimal growth prospects are labeled “value” stocks. Investors consider growth firms to be firms with growing business operations. LSV calculated the average growth rate in sales for all firms over the past five years. The 10 percent of firms with the highest average growth rates were glamour firms, whereas the firms with the lowest sales growth were value firms. Glamour or value—which stocks will be better investments over the next year? The next five years?

Using data for all stocks on the New York Stock Exchange and American Stock Exchange over the period 1963–1990, LSV reported the results in [Figure 8.1](#).³ If you bought the glamour stocks, you earned an 11.4 percent return the following

year. This compares with a return of 18.7 percent for the value stocks. The average total return over a five-year period is 81.8 percent for the glamour stocks and 143.4 percent for the value stocks.

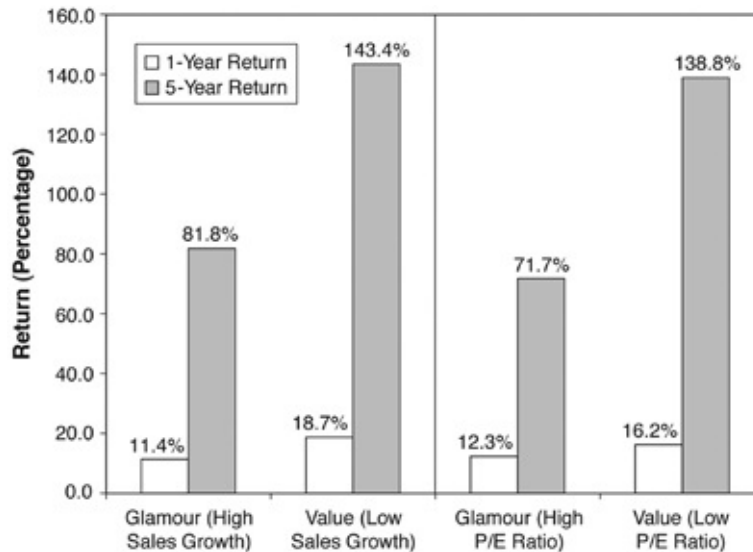


Figure 8.1 One-Year and Five-Year Returns for Glamour and Value Stocks

Data Source: Josef Lakonishok, Andrei Shleifer, and Robert Vishny, “Contrarian Investment, Extrapolation, and Risk,” *Journal of Finance* 48 (1994): 1541–1578.

Another popular measure of glamour/value stocks is the *price/earnings (P/E) ratio*. Companies with high P/E ratios are more glamorous than firms with low P/E ratios. The figure also demonstrates that value stocks outperform glamour stocks using the P/E ratio measure.

Good companies do not always make good investments. Investors often erroneously believe that the past operating performance of the firm is representative of the future performance, and they ignore information that does not fit this notion. Good companies do not perform well forever, just as bad companies do not perform poorly forever.

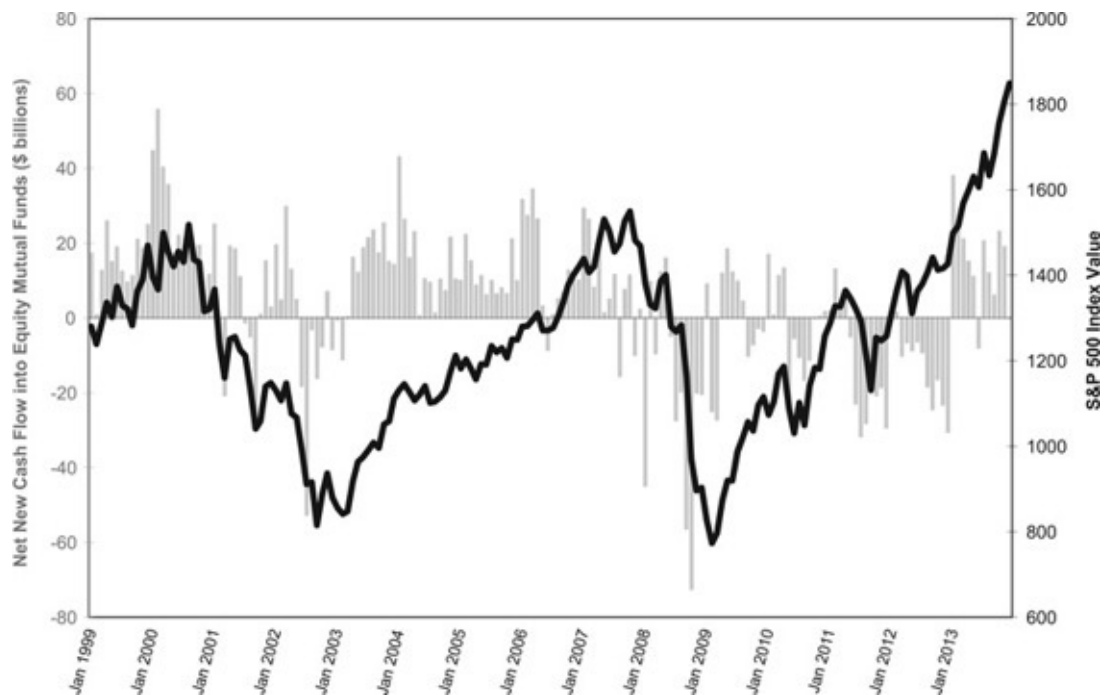


Figure 8.2 The Monthly Net Flow into Equity Mutual Funds Versus the S&P 500 Index

Data Source: Investment Company Institute, “Trends in Mutual Fund Investing,” various months.

Extrapolation Bias Investors also tend to extrapolate past stock returns into the future. Extrapolation bias is considered to be a subset of the representativeness bias because investors believe that past returns represent what they should expect in the future. Consider the case of whether to be invested in the stock market or not. When do investors get out of the market, and when do they get back in? [Figure 8.2](#) shows flows into (or out of) stock mutual funds every month and the level of the stock market via the S&P (Standard and Poor’s) 500 Index. Note how investors were plowing tens of billions of dollars into the stock market each month during the peak of the stock market tech bubble in the late 1990s and early 2000s. These investors bought high. Then they started to get out of the market in late 2002 and early 2003, right at the bottom. These investors sold low. Also notice the selling at the 2008 and 2009 stock market valley. By the time investors can identify a clear trend of the past in order to extrapolate it into the future, they have missed most of the move. Unfortunately, this bias leads investors to buying high and selling low, not a winning investment strategy!

Mary Bange investigates this behavior by studying the weekly and monthly

surveys conducted by the American Association of Individual Investors (AAII).⁴ AAI surveys its membership regarding their opinion about the stock market and their asset allocation. She finds that when AAI members express a change in their sentiment about the market, their subsequent allocation to stocks also changes. In other words, when investors become more bullish, they follow through and buy more stocks. Does this increase in bullishness come from superior market-timing abilities? No, she finds their market timing to be poor. The reason for their change in sentiment appears to come from past returns on the market. When the stock market had done unusually well during the past three years, investors become more bullish. When the market does poorly, they become more bearish. This extrapolation bias leads to poor asset-allocation timing decisions.

Investors also extrapolate past returns for individual stocks and mutual funds. The good (or bad) performance is expected to continue. For example, a stock that has performed badly for the past three to five years is considered a loser. On the other hand, stocks that have done great for the past three to five years are considered winners. Investors assume this past return is representative of what they can expect in the future. Investors like to chase winners and buy stocks of firms that have trended upward in price.⁵ However, losers tend to outperform winners over the next three years by 30 percent.⁶ Mutual fund investors also use this same extrapolating heuristic. The mutual funds listed in magazines and newspapers with the highest recent performance receive a flood of new investors. These investors are chasing the winners. Indeed, a study of investor mutual fund trades finds that the investors who follow mutual fund trends are investors who exhibit other behavioral biases in their investment activities.⁷ As this is not an optimal strategy, the return chasing money is often referred to as “dumb money.”

Indeed, this type of investing is so popular that it has its own name: *momentum investing*. Momentum investors look for stocks and mutual funds that have performed well over the past week, month, or quarter. Momentum traders look for good performers over the past few hours or even minutes. The media exacerbate the bias. For example, every day, the *Wall Street Journal* reports yesterday’s biggest percentage gainers, and throughout the day, you can find

which stocks have the highest price change for the day at any financial website.

Even finance professors are influenced by the representativeness bias. Ivo Welch has implemented several surveys of financial economics professors.⁸ The first series of surveys was implemented in 1997 through 1998, and an additional survey was conducted in 1999. These surveys elicited 226 responses. Note that these surveys were completed during a strong bull market. One question asked about the expected annual equity risk premium over the next 30 years. The mean response was 8.2 percent. In a separate question about stock market return mean reversion versus the random walk, the professors tended to lean toward the belief that the stock market mean reverts. Welch again surveyed the profession in 2001, when the market environment was quite different. The S&P 500 Index had declined by approximately 25 percent from its peak. Given the earlier expression that stock returns might exhibit mean reversion, we might expect respondents to express a higher equity premium estimate after a market decline. However, the mean annual 30-year equity risk premium was only 5.5 percent. Note that this is considerably lower than estimates provided only three years earlier. Although their updated estimates were about 2.7 percent lower, they reiterated their belief that stock returns are mean reverting. Yet their estimates are not consistent with that belief. The responses are consistent with the notion that the most recent past is representative of what will happen in the future.

In short, investors interpret the past business operations of a firm and the past performance of stock as representative of future expectations. Unfortunately, firms tend to revert to the mean over the long term. That is, fast-growing firms find that competition increases and slows their rate of growth. Disappointed investors, in turn, find that the stock does not perform as expected.

► Familiarity

People prefer things that are familiar to them. Fans root for the local sports teams, and employees like to own their company's stock. This is because the sports teams and the company are familiar to them.

When people are faced with two risky choices and they know more about one than the other, they will pick the more familiar option. Given two different gambles in which the odds of winning are the same but they have more experience with one over the other, people pick the better-known gamble. In fact, they will sometimes pick the more familiar gamble even if the odds of winning are lower.⁹

► Familiarity Breeds Investment

Tens of thousands of potential stock and bond investments exist in the United States with as many choices overseas as well. So how do investors choose? Do we analyze the expected return and risk of each investment? No, investors trade in the securities with which they are familiar.¹⁰ There is comfort in having your money invested in a business that is visible to you.

As an example, consider the breakup of AT&T. In 1984, the government broke up AT&T's local phone service monopoly into seven regional phone companies known as the "Baby Bells." Twelve years after the breakup, Gur Huberman investigated the ownership of these Baby Bells. He found that investors are more likely to own shares in their local phone company than the phone company of another region; that is, they are more comfortable investing in the more familiar firm. In a similar study of owning utility stocks, investors are found to be four times more likely to own the local utility firm compared to all other utility firms. This preference for the familiar is not reduced in samples of more affluent and sophisticated individual investors.¹¹ This preference for investing close to home also applies to investment managers.¹²

The inclination to invest in the familiar causes people to invest far more money within their own country than traditional ideas of diversification would suggest. Investors have a "home bias" because companies from their own country are more familiar to them than foreign companies.

[Figure 8.3](#) illustrates the home bias. The stock market in the United States represents over 43 percent of the value of all stocks worldwide. The stock markets in Japan and the United Kingdom represent 10 percent and 7 percent of the worldwide stock market, respectively. Therefore, to fully diversify a stock portfolio, investors should allocate 43 percent of their portfolio to U.S. stocks, 10 percent to Japanese stocks, and 7 percent to U.K. stocks. In fact, traditional

portfolio theory suggests that all investors should have this allocation.

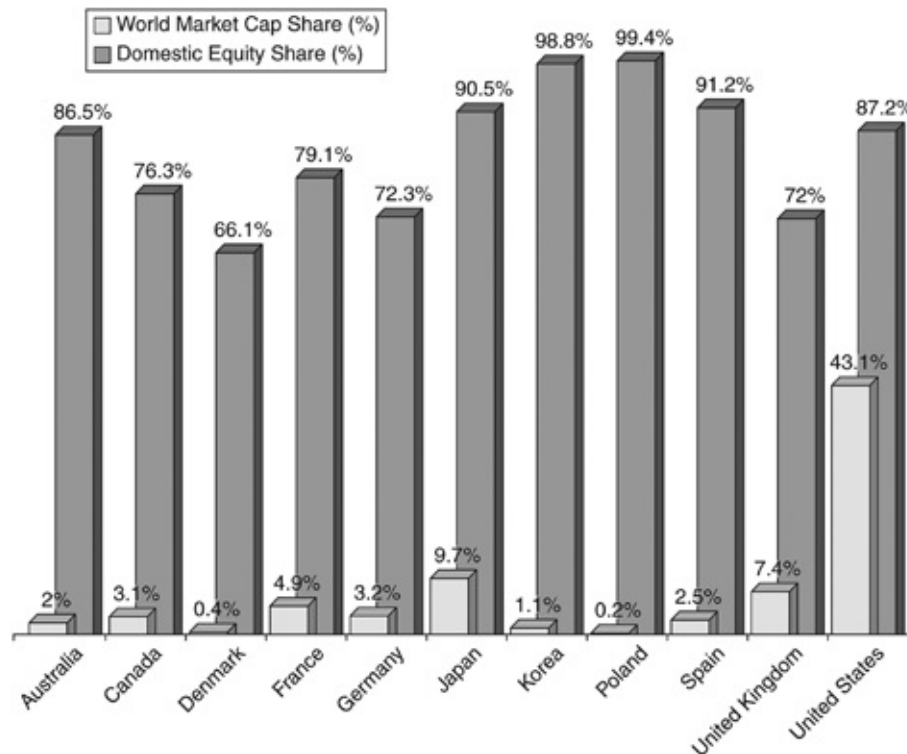


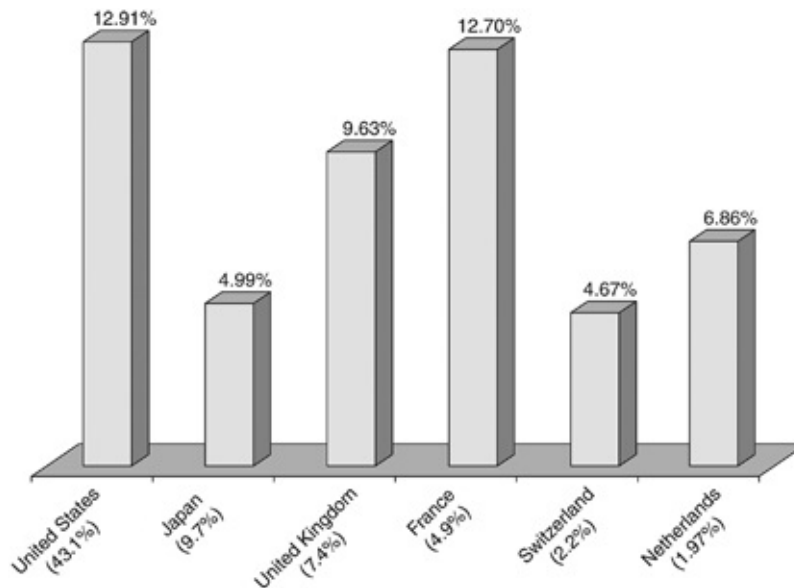
Figure 8.3 Market Weight of Country's Stock Market Compared to Total World (foreground) and the Percentage Share of Domestic Equity in the Country's Equity Portfolio (background)

Data Source: International Monetary Fund's Coordinated Portfolio Investment Survey for 2005.

Do real investors use this allocation? No. The International Monetary Fund surveys the equity portfolio ownership in each country, each year, and finds that investors overwhelmingly keep their money at home. U.S. investor equity portfolios have 87 percent invested in U.S. stocks, not the 43 percent predicted by portfolio theory. Japanese portfolios are 91 percent invested in Japanese stocks, and U.K. investors have 72 percent of the portfolio in U.K. stocks. As these numbers show, investors purchase the stocks of companies that are familiar to them, and people generally are less familiar with foreign firms.

When people do invest some of their money in foreign firms, what types of foreign firms do they buy? They buy foreign firms that are familiar, which means large firms with recognizable products. For example, non-Japanese investors tend to own the large Japanese companies.¹³ The smaller Japanese firms that attract

non-Japanese investors are the ones that have high levels of exports. [Figure 8.3](#) shows that German mutual funds invest a relatively smaller amount in their domestic equity. When they invest in foreign equity, where do they invest? [Figure 8.4](#) shows the six countries with the highest allocations of German mutual funds.¹⁴ Note that their foreign investments do not follow the proportion of worldwide equity. They invest nearly 13 percent in the United States, which has 43 percent of the world's equity. But Germans invest almost as much in France, which has only 5 percent of the world's equity. This overinvesting in some countries and underinvesting in others is called the *foreign bias*. Germans tend to overinvest in countries that are geographically close or have similar culture. Countries that seem distant (both geographically and culturally), like Japan for German investors, receive underinvestments.



[Figure 8.4](#) Allocation of German Funds to Equities in Other Countries; World Equity Market Share in Parentheses

[Chapter 7](#) illustrated that people do not think of their portfolios from a modern portfolio theory (MPT) perspective. If investors did use MPT when forming their portfolios, they probably would own far more foreign equities. Indeed, the small allocation that investors place in foreign equities implies that they perceive the riskiness of foreign assets to be two to five times larger than they historically have been.¹⁵ Investors also perceive the return of familiar assets to be higher than

those of unfamiliar assets.

Merrill Lynch surveys fund managers from around the world every month. Managers from continental Europe predict that their domestic stock returns will be higher than those of the United Kingdom, the United States, and Japan.¹⁶ At the same time, managers in the United Kingdom predict that their domestic returns will be the highest. In short, investors are more bullish on their domestic market relative to foreign markets. The familiarity bias causes investors to be too confident in stocks that are familiar, judging them too optimistically on expected return and risk. Likewise, the stocks that are unfamiliar are judged too pessimistically on risk and return.

Local Bias People in the United States pick familiar foreign firms and bias their portfolios toward U.S. companies. Investors also tilt their portfolios toward local firms. For example, Coca-Cola's headquarters is located in Atlanta, Georgia. Investors living in Georgia own 16 percent of Coke,¹⁷ and the majority of these investors live in Atlanta. Coke sells its products worldwide, but the people most familiar with the company own a large percentage of it.

This local bias is more general than just Coca-Cola stock holders. Professors Ivkovic and Weisbenner found that the average U.S. household invests 30 percent of its portfolio in companies headquartered within 250 miles of their home. Studies of international portfolio holdings show that both Swedish and Finnish investors also tilt their portfolios toward local firms.¹⁸ In addition, people who move from one city to another within Sweden rebalance their portfolio. The farther away they relocate from a company, the more likely they are to sell that firm's stock. The new stocks they buy are biased toward being located in the area they have moved to. Interestingly, two languages are common in Finland: Finnish and Swedish. Firms may issue annual reports and other documents in either (or both) languages. Not only do investors in Finland tilt their portfolio toward local firms, they also tilt toward same-language firms. In short, investors seem to want to invest in companies that are familiar. Being more visible due to geographic proximity increases that familiarity.

Professional money managers also invest in the familiar. Even though U.S.

professional investors have access to vast information sources and analysis tools, they tilt their portfolios toward local firms. This is especially true for local small firms and riskier firms. On average, the firms that a professional money manager buys are headquartered 100 miles closer to the manager's office than the typical U.S. company.¹⁹

Market Impacts If a psychological bias impacts many people, then their aggregate behavior might impact the capital markets. For the familiarity bias, several interesting studies suggest that the market is influenced by the familiarity bias. First, several scholars believe that the local bias of investors distorts stock prices in regions of the United States.²⁰ In some places, there are few companies available for investors. Because these firms are the “only game in town,” they face little competition for local investors' dollars. The price pressure from investors concentrating on few firms may drive those firms' prices higher, relative to similar firms in other regions. They estimate that the price of a firm in the Deep South (relatively few firms) is 7.9 percent higher than a comparable firm in the middle Atlantic region (relatively many firms). This effect is smaller for the largest firms (4.1 percent), who have broader name recognition outside the area. The effect for the smallest 75 percent of the firms is much larger, 9.9 percent. In short, the local bias of investors may skew the stock prices of smaller, less visible, regional firms.

In the international context, risk sharing between foreign and domestic investors lowers the risk in a particular stock market. Lower risks should result in lower expected returns due to the lower risk premium. Therefore, in the long run, national stock markets with lower home bias should have lower returns. In each of 38 countries, the second study computes a measure of home bias and compares it to the country's MSCI index return.²¹ [Figure 8.5](#) shows a scatter plot of home bias versus annual market return (during the period 1998 to 2007) for the 38 countries. Note the clear trend of higher home bias being associated with higher domestic market return. This creates a high cost of capital for the firm in countries with high degrees of home bias.

When an investor makes foreign investments, familiarity is clearly involved. But it might go a step further than that. People seem to invest in what is popular. One

study compares the popularity of foreign countries to Americans from a Gallup poll to investment in those countries through country closed-end funds.²² Closed-end funds are interesting because they hold a portfolio of stocks that have a known value. But the closed-end fund itself trades on an exchange at a price derived from the trading process. So the closed-end fund stock price may be different from the underlying value of its portfolio. In fact, closed-end funds usually trade at a discount to the underlying value. The Gallup poll shows that Americans like the British more than the French. The study shows that closed-end funds focused on companies from England have a lower discount to value than funds focused on French companies. This finding is true for closed-end funds focused on 15 different countries over a 15-year period. This type of impact also occurs for foreign companies that list their stock in the United States through American Depositary Receipts (ADRs). So, not only does the familiarity (popularity) bias affect investors, it also impacts pricing in the market.

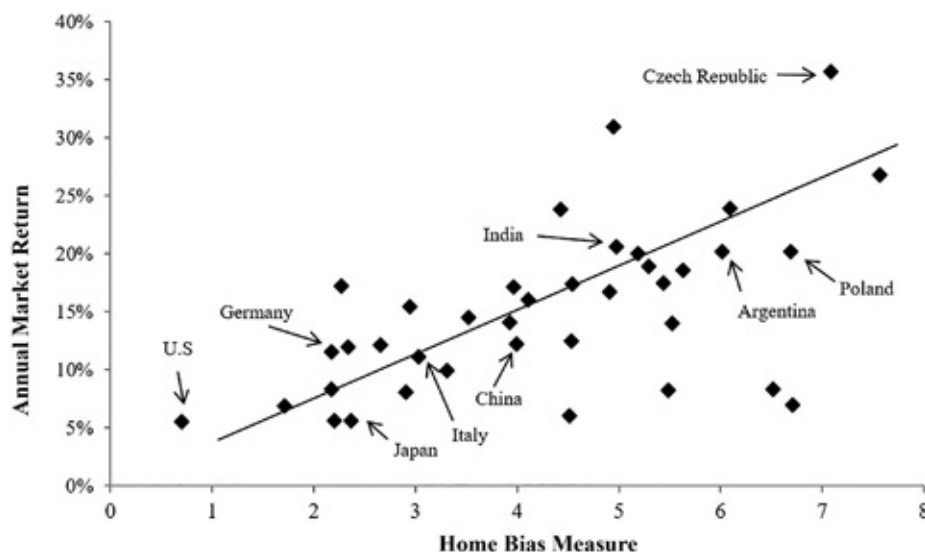


Figure 8.5 The World Price of Home Bias

Data Source: Sie Ting Lau, Lilian Ng, and Bohui Zhang, “The World Price of Home Bias,” *Journal of Financial Economics* 97 (2010): 191–217, [Table 1](#).

What’s in a Name? Does the name of a company matter to investors? In William Shakespeare’s play *Romeo and Juliet*, Juliet quips that, “What’s in a name? That which we call a rose by any other name would smell as sweet.” She is implying that the name of something does not affect what is really is. It turns out that this

is not true for stocks. The company name does matter. More familiar company names are more popular with investors. Clifton Green and Russell Jame examine the fluency of corporate names in the United States.²³ They measure the ease of pronouncing a company name through its Englishness and whether the words are found in a spell-check filter. The more fluent the name, the more familiar it will seem to a potential investor. They find that firms with more fluent names have higher breadth of ownership, greater trading volume, and higher valuation ratios. This shows that investors favor firms that seem more familiar because they have more fluent names. The authors also report that firms that change names to a more fluent one increase ownership, volume, and valuation. Lastly, they show that this effect also occurs with mutual funds (which attract greater fund flows) and closed-end funds (which have lower discounts). Another study shows that investors favor mutual funds whose manager's name is not foreign-sounding.²⁴ Note that the name of a company or mutual fund is not related to its success in business or investing, it simply impacts investors desire to buy them. Indeed, familiarity bias seems to impact returns, risks, ownership, and valuations in the stock market.

► Familiarity Breeds Investment Problems

Which company are you most familiar with? People are generally most familiar with the company they work for. This familiarity causes employees to invest their pension money in the company stock. For example, a company 401(k) pension plan allows employees to invest money in options like a diversified stock fund, a bond fund, and money market instruments. One common option is the company's stock.

Traditional portfolio theory suggests that employees should diversify their retirement assets by selecting diversified stock, bond, and money market funds as needed according to their risk tolerance. Selecting the stock of one company is very poor diversification. In fact, because people already have their labor capital tied up in the company, to fully diversify, they should avoid investing their financial capital in that firm, too.

If your job and your retirement assets depend on one company, you could be in for a shock. Consider the plight of the employees of companies like Enron and Global Crossing. Measuring from the stock price peak values, the proportion of Enron employee 401(k) assets invested in Enron stock was 60 percent. The proportion of company stock in the Global Crossing 401(k) plan reached 53 percent. After Enron declared bankruptcy, thousands of its employees saw 401(k) losses total \$1.3 billion. After the Enron and Global Crossing bankruptcies, the media wrote about employees who had their entire retirement fund invested in the company stock, which became worthless. Many of these people also lost their jobs.

Is it common for employees to invest their retirement money in their company's stock? Yes. In a survey of 246 of America's largest companies, 42 percent of the total 401(k) plan assets were invested in the company stock.²⁵ Employees themselves make this decision. They like investing in the company stock because

it is familiar. This is dangerous!

When you are familiar with something, you have a distorted perception of it. Fans of a sports team think their team has a higher chance of winning than nonfans of the team. Likewise, investors look favorably on investments they are familiar with, believing they will deliver higher returns and have less risk than unfamiliar investments. For example, Americans believe the U.S. stock market will perform better than the German stock market; meanwhile, Germans believe their stock market will perform better.²⁶ Similarly, employees believe the stock of their employer is a safer investment than a diversified stock portfolio.²⁷

Overconcentrating a portfolio in only one stock is risky. However, employees do not want to believe that about the stock of their company. The Morningstar.com website asked investors this question: Which is more likely to lose half of its value, your firm or the overall stock market? It is far more likely that any single company would experience such a large price move than a diversified portfolio, especially the overall market. However, more than 1,000 investors responded to the question,²⁸ and only 16.4 percent of the respondents believed their company was riskier than the overall stock market. Of those investors without a college education, only 6.5 percent believed their company was riskier than the stock market. No one company is safer than a fully diversified portfolio like the overall stock market, so the familiarity bias clearly influences one's perception of risk.

The brain often uses the familiarity shortcut to evaluate investments. This can cause people to invest too much money in the stocks that are most familiar to them, like their employer's stock. Ultimately, this leads to a lack of diversification. In summary, investors allocate too much of their wealth to their employer, local companies, and domestic stocks.

► Combining Familiarity and Representativeness Biases

Employees often compound the familiarity bias by combining it with the representativeness bias. Consider the ownership of company stock in employees' 401(k) plans. Employees tend to buy more of their company's stock after its price increases.²⁹ Employees who work for a company whose stock price increase ranked among the top 20 percent of all firms in the past five years allocated 31 percent of their contributions to the company stock. This compares to an allocation of only 13 percent to company stock in firms whose performance was in the worst 20 percent. The actual 401(k) asset allocation behavior of employees suggests that they use the past price trend (the representativeness bias) as a determinant for investing in the company stock (the familiarity bias). However, this is not a case of employees, as insiders, having good information about their firm. Firms with high employee pension plan ownership did not perform any better, on average, than those with low employee pension plan ownership.

► Summary

Mental shortcuts, also called heuristic simplifications, help us analyze situations and make decisions quickly in our daily life. However, this process often leads us astray when analyzing decisions with risk and uncertainty. Because investing decisions involve substantial risk and uncertainty, our decisions are biased in predictable ways. The representativeness bias causes us to extrapolate the past and assume that good companies are good investments. The familiarity bias causes us to believe that firms we are familiar with are better investments than unfamiliar firms. Thus, we own more local firms and our employer's stock and few international stocks. Thus, these biases lead to low diversification and higher risks.

► Questions

1. A statement found in every mutual fund prospectus is “Past performance is not indicative of future performance.” Yet investors tend to use past performance as an important factor in making investment decisions. Why?
2. Why do investors in one country believe the return will be better and the risk is lower in their own country’s stock market than in other countries’ markets?
3. What are the home bias and foreign bias, and how are they related to familiarity?
4. How do the familiarity bias and the representativeness bias combine to influence the 401(k) pension plan choices of employees?

► Notes

- [1](#) See discussions in the following sources: Hersh Shefrin, *Beyond Green and Fear: Understanding Behavioral Finance and the Psychology of Investing* (Boston: Harvard Business School Press, 2000); Hersh Shefrin and Meir Statman, “Making Sense of Beta, Size, and Book-to-Market,” *Journal of Portfolio Management* 21 (1995): 26–34; and Michael Solt and Meir Statman, “Good Companies, Bad Stocks,” *Journal of Portfolio Management* 15 (1989): 39–44.
- [2](#) See the empirical evidence in Werner De Bondt and Richard Thaler, “Does the Stock Market Overreact?,” *Journal of Finance* 40 (1985): 793–808; and the theoretical model of Nicholas Barberis, Andrei Shleifer, and Robert Vishny, “A Model of Investor Sentiment,” *Journal of Financial Economics* 49 (1998): 307–343.
- [3](#) See panels C and D of table 1 in Josef Lakonishok, Andrei Shleifer, and Robert Vishny, “Contrarian Investment, Extrapolation, and Risk,” *Journal of Finance* 48 (1994): 1541–1578.
- [4](#) Mary Bange, “Do the Portfolios of Small Investors Reflect Positive Feedback Trading?” *Journal of Financial and Quantitative Analysis* 35 (2000): 239–255.
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- [9](#) Chip Heath and Amos Tversky, “Preferences and Beliefs: Ambiguity and Competence in Choice Under Uncertainty,” *Journal of Risk and Uncertainty* 4 (1991): 5–28.
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Social Interaction and Investing

People learn through interacting with other people. We watch the behavior of others to interpret their beliefs, but mostly we enjoy the social interaction of conversation; that is, we like to talk. We talk about subjects that excite us, topics that interest us, and even topics that worry us. Talking is an important way to obtain information and detect emotional reactions, which help form our opinions.

Our culture has experienced at least one tremendous shift in what we talk about over the past couple of decades. I refer to investment talk. The *social norms* of investment chat have changed dramatically. It was not so long ago that people avoided talking about investing. Asking someone about his or her mutual funds or talking about your stocks just wasn't done in a social setting.

Now, investment talk is heard everywhere. The financial channel, CNBC, was launched only in April 1989, yet when you go out to lunch, you'll often find it is being shown on the television. Now, dozens of regional and national radio shows dedicated to investing are being aired. This change in our social norms has had a dramatic impact on our investment behavior. As more people talk about investing, others become interested, too.

► Talking the Talk...Tweeting the Tweet

Conversation allows for the rapid exchange of information, opinions, and emotions. This is important for the stock market and investing. Stock brokers converse with clients and other brokers. Analysts communicate with executives and managers, and they form local groups and associations to interact with each other. People seek information and expert opinions from social media, like Twitter and Facebook. Institutional investors form groups for sharing information. Individual investors talk to family members, neighbors, colleagues, and friends about investing.

For example, a survey of 156 high-income investors showed that more than half the time that an investor becomes interested in a stock, it is because another person mentioned it.¹ In addition, the survey found that since buying the stock, the new investor had spoken to an average of 20 other people about the company.

Investors form a belief about what return and level of risk they expect from the stock market. But we also seek to understand the beliefs of others. These second-order beliefs about what others expect from the market can impact our behavior. When other investors appear to be more optimistic than our expectations, we buy more stocks than our own beliefs justify.² When others are more pessimistic, we allocate less of our portfolio to stocks. But even this process is fraught with biases. People tend to think that their beliefs are more common than they really are, which is a false consensus bias. In addition, people think that others who disagree with them are biased. Yet, we are influenced by our overall impression of what others believe about the market.

Imitate Thy Neighbor's Portfolio Because information is obtained and decisions are formed through talking with others, social people are more likely to learn about investing than less-social people. Consequently, highly social people are more likely to invest in the stock market or to participate in their 401(k) plan. A

group of researchers studied the relationship between socially active households and participation in the stock market.³ A social household is characterized as one in which its members interact with neighbors or attend church. The researchers used responses from a survey of 7,500 households in the Health and Retirement Study of Households. They found that social households are more likely to invest in the stock market than nonsocial households and that social households that live in areas with high stock market participation are even more likely to invest in the stock market if they are socially active. Therefore, the social interaction influence is magnified when the person is in the right environment—one that has investors in it.

Other scholars have extended this idea to investor portfolio holdings. They argue that information about investing will diffuse through neighborhoods from word-of-mouth effects.⁴ Even though investors tend to hold few stocks in their brokerage accounts (median is four), they still find a strong neighborhood effect. When a household's neighbor increases purchases in an industry by 10 percentage points, the household also increases purchases in the same industry by 2 percent. The effect is much stronger for purchases in stock of local companies. When your neighbor increases his or her purchases by 10 percent, you tend to increase yours by a matching amount. This neighborhood effect has been found using both stock brokerage data and IRS tax return data. The information diffusion seems stronger in states that are more social, indicating the residents are more comfortable seeking advice from others. It appears to be more than just a community effect. Examining professional money managers that live in the same neighborhood, one study illustrates that managers have more similar holdings and trades when they share an ethnic background.⁵ Sharing cultures makes them more socially connected and more likely to interact.

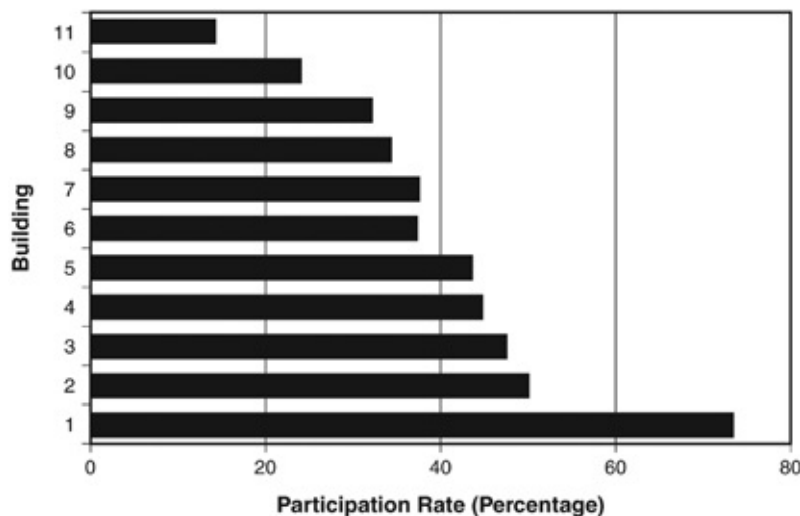
Using social media is the new talk. Investors communicate with each other via messaging forums like Twitter. A team of German scholars investigated the relationship between 250,000 stock-related tweets and activities in the stock market.⁶ The tweets can be one-sided, either optimistic or pessimistic, about the stock. Or the tweets can exhibit much disagreement. They find that the sentiment of the tweets is positively related to the stock returns. Positive sentiment

exhibited in the tweets is associated with positive returns. A higher number of tweets is connected to a larger volume of stock trading. Lastly, a greater disagreement with the tweets is related to more volatility in the market. It appears that investor talk is transitioning to social media environments. One reason for this could be the easier access to experts. The study shows that people who provide better than average advice get retweeted more often and have more followers.

► Social Environment

You can be judged by the friends you keep, per one old saying. But does your social group affect your wealth? The answer appears to be yes. People in a peer group tend to develop the same tastes and interests as well as the desire to live a similar lifestyle. Peer groups develop social norms according to the preferred beliefs of the group. Beliefs about investing are also a part of these social norms. If investing is not valued by the peer group, the conversation will rarely (if ever) turn toward investment topics. Another peer group might discuss stocks frequently. The social environment impacts one's investment decisions.

One common example is participation in a 401(k) retirement plan (or other contribution plan). Because of the tax advantages, contributing to a retirement plan is a wise decision. If the employer also contributes in some matching way, that is even better. Yet many (even most) people do not participate. Education and wage levels are a determinant of participation in the 401(k) plan; however, the social norms of employees also impact the participation decision.



[Figure 9.1](#) Pension Plan Participation Rates for 436 Librarians in 11 Locations

To illustrate how dramatic the peer effect can be, consider the participation rate

of 436 university librarians studied by Esther Duflo and Emmanuel Saez.⁷ These librarians work in 11 different buildings throughout campus. Librarians are highly educated people. In addition, they are specifically trained in how to find information. Surely, librarians should make the wise choice and contribute to their retirement plans. The participation rates for the librarians in each of the 11 buildings are shown in [Figure 9.1](#). Note the large difference in participation rates. In one building, 73 percent of the librarians participate, but in a different building, only 14 percent participate.

Differences in magnitude usually can be explained by groups having dissimilar education levels, salary levels, or both. People with higher education levels and higher wages are more likely to participate in a 401(k) pension plan. However, this study concerned only librarians, so they all have a relatively similar level of education and wages.

Because librarians are such a homogeneous group, the large variation in participation rates is striking. One explanation for the large differences is the social norms of each building. The social norms of each peer group develop over time. The norms in some buildings included in this study developed to value retirement plans, but in other buildings, the norms developed such that participation in the retirement plan is not valued.

However, in this study, Duflo and Saez have no direct evidence of librarians influencing each other in the workplace. So they followed up this study with another retirement plan experiment at a large university in which a random sample of people from all the departments was invited to a benefits information fair.⁸ At the fair, participants were encouraged to contribute to their defined contribution plan. Here is how the experiment worked. Of all the people who were invited, a small subset were told in advance that they were selected to receive a \$20 reward for attending. Consider three groups: (1) winners of the reward; (2) non-winners in a department with a reward winner; and (3) non-winners in departments without any winners of the reward. It is not surprising that the winners had the highest attendance rate at the fair. Their attendance was five times greater than the third group (non-winners in non-reward departments). What is surprising is that the people in group 2 (the non-winners in a department

with a winner) were three times more likely to attend the fair than people in group 3, even though neither of the groups received the reward. Why would the group 2 people want to go to the fair so much more than the group 3 people? Because they socially interact with the reward winners in their department, they learn of others planning to attend and may even interpret the giving away of a reward as a signal that the information at the fair is important. This effect continued past the fair and influenced decisions to contribute. The resulting contribution rate for people in group 2 was higher than those in group 3.

► Investment Clubs

One example of the socialization of investing is the rapid growth of investment clubs. An investment club is a group of family members, friends, or coworkers who have banded together to pool their money and invest it in the stock market. Frequently, the clubs are all men or all women. These groups typically meet once per month and discuss potential stock investments. Every month, the members each contribute some nominal amount (\$20–\$100), which is pooled and invested.

The creation of investment clubs is fostered through the National Association of Investors Corporation (NAIC). Although not all clubs are members of the NAIC, the organization boasted 35,810 clubs and 537,150 total members by the end of 2000. This is a substantial increase from the 7,087 clubs registered in 1990. However, after the financial crisis, the number of clubs dropped to 8,600 in 2009 and was at 4,000 in 2015.

Investment Club Performance How do most investment clubs perform? The financial press has made frequent claims suggesting that anywhere from 60 percent to two-thirds of the investment clubs beat the market. If true, this figure would be impressive given that most mutual funds don't routinely beat the market.

However, it is unlikely that these figures accurately reflect the performance of most investment clubs. The claims come from annual surveys of clubs by the NAIC. Consider the problems with this type of survey. First, the clubs must properly calculate their annualized return.

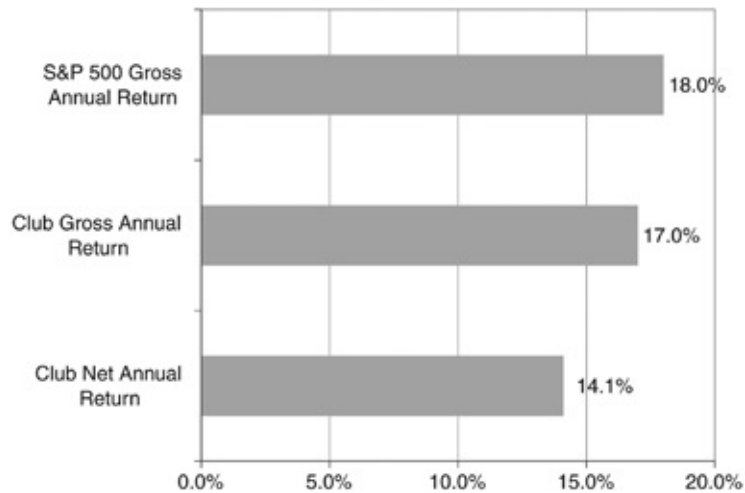
Second, which clubs respond to the survey? If you were the treasurer of a club, when would you respond to a survey by the NAIC? You would be far more likely to fill out the survey if your club's returns were high and avoid filling out the survey if the returns were low. The psychological biases of seeking pride and avoiding regret suggest this behavior (see [Chapter 3](#)). Indeed, only 5–10 percent

of the clubs return the NAIC survey. It is likely that these are the clubs that calculated a high return. Therefore, the survey results represent only the more successful clubs (at best) and are probably totally misrepresentative of all clubs (at worst).

To get a more objective view of investment club performance, the actual stock holdings of 166 investment clubs using a national discount broker were examined over a five-year period.⁹ As [Figure 9.2](#) shows, the results are not good. During this five-year period, the Standard & Poor's 500 Index earned an average 18 percent return annually. The clubs averaged a gross return of 17 percent per year. The return net of expenses was only 14.1 percent, so the clubs substantially underperformed the market.

Although media reports suggest that more than 60 percent of the clubs beat the market, it appears that 60 percent underperform the market. Indeed, the investing behavior of these clubs shows some of the same psychological biases as individuals do. Specifically, trading behavior is consistent with overconfidence ([Chapter 2](#)) and the disposition effect ([Chapter 3](#)).

[Investment Clubs and Social Dynamics](#) Although a club's purpose is to create an environment for learning about investing and achieving good returns, most clubs also serve a social purpose; that is, the meetings themselves provide a pretense for family members or friends to get together. Members tend to like the idea of sharing research skills and knowledge about the market while socializing on a regular basis.



[Figure 9.2](#) Investment Club Performance Versus Market Performance

The social dynamics of the club play an important role in its investment success. Although some clubs invest as a pretense to socialize, other clubs take their stock picking seriously. For example, the Klondike Investment Club of Buffalo, Wyoming, was rated the number one investment club in America one year by *Value Line*.¹⁰ The 18 members of the club come from all walks of life. Some are young and some are old, some are blue-collar workers and some are white-collar workers, some have advanced degrees, and others are business owners.

What is the secret of their success? The Klondikers exercise a high degree of investment formality. For example, this group requires all investment decisions to be made with the help of a rigorous report produced by the sponsoring member. They rely on research, not just stories about a firm. This is important because the approach helps the club avoid some psychological biases. Decisions are based on reason and logic rather than emotion.

Other investment clubs are formed with social interaction as their primary objective. Consider the California Investors Club, which was founded by a group of retired friends who had worked together for many years. Although their social events such as the Christmas party and a day-long golf outing are planned in great detail, their investment decisions are often made without much analysis.¹¹ Discussion frequently centers on hot tips and speculations; thus, the club frequently buys at the top and later sells at the bottom. Consequently, the club

has earned a poor return. The informality of this club allows each member's psychological biases to combine with those of the others and be magnified.

► The Media

A large part of our social environment is the media, with various venues and media shows competing for our attention. If the news isn't well written or well told, the audience will change the channel or click to a different website. Business and investment writers keep us interested by telling a good story. Reporters also search for the best sound bite to quote. By its very nature, the sound bite is short and catches our attention, but it cannot convey any serious investment analysis; it is designed to convey a story. Most of the time, the media exacerbate our bias toward storytelling and away from formal investment analysis.

Although the media provide us with information and expert opinions, the experts express themselves through one-line explanations and quips. Many of these experts have access to research departments and tremendous analysis tools. Surely, we assume, their opinions are based on significant analysis. However, they rarely talk about the actual analysis, so we get the impression that investment analysis is simply storytelling. By trying to appeal to our interests and emotions, the media naturally gravitate toward the active investment decisions of stock selection and market timing.

Yet media stories appear to impact investor behavior and stock prices even when it provides no new information. Paul Tetlock examined the market reaction to the daily "Abreast of the Market" column in the *Wall Street Journal*.¹² Tetlock categorizes each column by its level of pessimism for the stock market. High levels of pessimism or optimism in the morning article lead to unusually high trading later that day. The Dow Jones Industrial Average earned 0.25 percent more during the day after highly optimistic articles than highly pessimistic articles. However, these articles do not appear to have provided any lasting information. For example, the downward pressure on stock prices after a pessimistic column is reversed during the next few days of trading. While entertaining, the "Abreast of the Market" column does not seem to provide any

new information to the market. Nevertheless, investors seem to trade as if it does.

Paul Tetlock also examined the pricing impact of stale news in general (not just the ‘Abreast of the Market’ column).¹³ He concludes that it is individual investors who react to news articles that contain old, previously released information. Stocks dominated by individual investors, not institutions, experience a significant return on the stale news day that is reversed over the following days. Not only do investors sometimes fail to distinguish between old information and new information in news, the financial media commonly transmits stale news. In addition, the media exacerbates investor biases. For example, investors tend to chase winners ([Chapter 8](#)). They like to buy the mutual funds that have experienced high past returns. This is because the representativeness bias causes us to believe that those past returns represent what to expect in the future. However, investors appear to only buy the mutual funds with past returns that appeared in the media.¹⁴ The media contributes to investor chasing of returns.

Language

“The difference between the right word and the almost right word is the difference between lightning and the lightning bug.”

—Mark Twain

Words are inherently less objective than numbers. Thus, they might influence investor judgment in different ways. Not all words have the same impact on the reader. Some words create vivid imagery that is emotionally interesting. Are investors’ judgments different in learning that “Apple’s sales jumped” versus “Apple’s sales increased”? What about commentary like “very impressive” versus “exceeded the expectations”? Are we susceptible to hype?

An interesting experiment examined the impact of positive vivid words on people during a bull market and negative vivid words during a bear market.¹⁵ During the context of a bull market, subjects were divided into those with long stock positions and those with short stock positions. Thus, those with short market positions are contrarian to the trend and consensus. Within each long/short

group, people were given positive news framed in either vivid or pallid phrases and then asked for a forecast. We should expect that people with long positions during a bull market will give higher predictions about the future than the contrarians with short positions. But which group is more influenced by the hype?

The study reports that the people with long positions during a bull market give similar predictions when given either vivid or pallid phrases. However, the contrarian people's predictions are impacted by the hype words. Those with short positions during the bull market give higher predictions when presented with vivid words compared to being shown pallid words. The experiment was redone and framed in a bear market. Here, the people with short positions are consistent with the trend and consensus and the people with long positions are the contrarians. Vivid and pallid negative news treatments were administered. Again, it is the people with contrarian positions that were sensitive to the choice in words. Interestingly, vivid language, or hype, does not stoke the beliefs of those who already believe in the popular consensus. Instead, it is the contrarian investors who are sensitive to the vivid language.

When it comes to investment hype and entertainment, the gold standard is likely Jim Cramer on his *Mad Money* show on CNBC. His vivid language is augmented by flashing lights, horns, and BUY, BUY, BUY or SELL, SELL, SELL buttons. Does this showmanship impact people's behavior? A study of the returns on the stocks he discusses suggests that it does. The scholars find that the stocks recommended do not earn extra returns over what they should given their level of risk.¹⁶ This means that the show does not offer new information or predictability. However, there is a dramatic short-term price reaction. Overall, stocks surge nearly 2.5 percent the night of the recommendation. That return dissipates over the next few weeks. The return is higher for smaller companies and for stocks that get highlighted during a show with a larger viewership. This attention to specific stocks causes a temporary mispricing because of the short-term demand it causes for them.

► Herding

As you learn what other people think about various stocks, a social consensus forms. As people act on this consensus, a herd forms. Investor herding is not unlike that of the antelope. Antelope stay together in herds to protect themselves from predators. One minute the herd of antelope is doing nothing, and the next minute the herd is in full gallop. An antelope always has its eyes and ears open so that it knows what the other antelope are doing—it doesn't want to be left behind and exposed to danger.

Investors also keep an eye and ear open to what other investors are doing. Many people watch CNBC every day or closely follow chat room postings on a favorite website. Active investors check their portfolio daily. When things start moving, investors everywhere know about it.

The problem with moving with the herd is that it magnifies the psychological biases. It causes one to make decisions that are based on the “feel” of the herd instead of the rigor of formal analysis. In addition, the feeling of regret on picking a loser ([Chapter 3](#)) is lower when you know that many others picked the same stock. Misery loves company.

Herding into Stocks When many investors are influenced by their psychological biases in a common way, a herd forms and the overall market can be affected. This is best illustrated by the irrational exuberance for Internet companies in the late 1990s. Many investors and analysts have been puzzled by the extremely high valuations of Internet firms. For example, when the historical average price/earnings (P/E) ratio of the market is around 15, what was the justification for Yahoo!'s P/E of 1,300 or eBay's P/E of 3,300 in late 1999? Many analysts concluded that new valuation measures were needed for this new revolution in the economy.

Or consider the valuation of eToys,¹⁷ an online toy retailer that went public in

1999. Shortly after the initial public offering, the high price of the stock created a total value of the firm of \$8 billion. Typical of Internet companies, eToys had negative earnings of \$28.6 million from \$30 million in sales. The natural comparison for eToys is Toys “R” Us, the “old economy” leading toy retailer. Even though Toys “R” Us had profits of \$376 million, it had a market value of only \$6 billion; that is, Toys “R” Us had a lower market valuation than eToys even though it earned 12 times more in profits than eToys had in sales.

This is even more astounding when you realize that the barrier to entry for firms getting on the Web is low. As you might recall, young entrepreneurs started many of the Internet firms on only a shoestring budget. Indeed, Toys “R” Us quickly developed its own online retail capability, and eToys’ market capitalization fell from \$8 billion to \$29 million.

[“A Rose.com by Any Other Name”](#) Consider the extent of herding in Internet companies. One example is firms that changed their name to FancyNewName.com. Investors went dot-com crazy and scooped up shares of any company related to the Internet. The easiest way to determine whether a firm is related to the Internet is by its name.

Consider the case of Computer Literacy Inc., an online retailer of technology books. This firm changed its name to [fatbrain.com](#) because customers kept misspelling (or forgetting) its former Internet address, computerliteracy.com. Note that this firm was already providing its service over the Internet. The change was in name only, not in business strategy. But when word leaked out about the name change, the online stock discussion groups sizzled, and the stock climbed 33 percent in one day!

From mid-1998 to mid-1999, a total of 147 publicly traded companies changed to a new name with a dot-com or dot-net ending or a name that included the word *Internet*.¹⁸ During the three weeks after a name change announcement, these firms’ stock beat the market by an average of 38 percent. All kinds of firms got in on the action. Some of these firms were already pure Internet companies. They beat the market by 57 percent during the three weeks after the name changes. Other firms that changed their names had only some Internet experience. These

firms earned 35 percent over the market. Some firms that changed their names were changing from a non-Internet to an Internet focus and beat the market by 16 percent. In fact, even firms with little or no Internet experience changed their names and enjoyed the large stock price increases. These firms had a non-Internet core business, and no evidence was available to show that these firms had the expertise or experience to be successful. Yet Net-crazy traders bid up their stock prices to such a degree that they beat the market by 48 percent. These huge increases in stock price did not diminish over the following three months. Investors appeared to be eager to throw money at Internet companies. Interestingly, after the dot-com bust period in 2000, 67 companies removed the dot-com reference from their name. This name change was associated with an average 64 percent return during the next two months.¹⁹ Investors do appear to be affected by cosmetic changes.

Investors have been frequently fooled by other name changes, too. Some mutual funds change their name to reflect the previous period's "hot" style (like value, growth, small stocks, and so on). This name change causes 28 percent more money to flow into the fund than otherwise expected.²⁰ This new money flow even occurs for funds that change their name but do not improve upon their investment style or performance.

Interestingly, having a cute ticker symbol can impact firm value. People notice the ticker, BUD, for Anheuser-Busch InBev. People like the ticker, LUV, for Southwest Airlines, and YUM for Yum! Brands. While Nordstrom and China Southern Airlines may be fine companies, their ticker symbols (JWN and ZNH) do not excite investors. Does this matter? Apparently, it does matter. Firms with more likeable ticker symbols have higher valuations.²¹

► Short-Term Focus

In active trading, your thoughts are more like those of a trader than an investor. Instead of buying a stock because you think the company's products, market share, and management will dominate in the future, you buy a stock because you think the price will rise during the next week, day, or hour. The firm's products, market share, and management become ancillary or even irrelevant. Take Sharon, for example, who was interviewed by the PBS show *Frontline*.²² She invested her family's entire life savings into two tiny technology stocks, placing most of it in one firm. "To tell you the truth, I don't even know the name of it. I know the call letters are AMLN. It's supposed to double by August," she said. For the record, AMLN is the ticker symbol for Amylin Pharmaceuticals.

Faith "Things are different this time. The old valuation measures are no longer appropriate." These are the types of comments that are often uttered during a period of extreme herding because the high prices cannot be justified with traditional measures. When the scale says you have gained 30 pounds, the problem is obvious—your scale no longer works. While investing with the herd, people invest based on faith, not due diligence.

Social Validation People want to talk about investing. Conversation about investments becomes popular at social occasions, and the online discussion groups heat up. The expansion of radio talk shows featuring investment discussions and the call-in questions to CNBC demonstrate how investing invades other parts of life.

Herding and overvaluation do not occur because of new economics or new technologies—they occur because of the human psyche. New economics and new technology are only the rallying cry for the herd. When overconfidence (see [Chapter 2](#)) is combined with emotions, a problem results. The problem is magnified when everyone is caught up in making psychology-biased decisions.

► Summary

People learn through interacting with each other. We talk about our beliefs about investing and seek the opinions of others. The opinions of our neighbors, friends, and colleagues impact our decisions. This allows more social people to gain confidence in their investing activities. Investment clubs are a formalized process of investing socialization. But clubs with a stricter investment procedure have more success than clubs focused on social activities. One outcome of social interaction is that investors tend to herd into the same stocks.

The media transmits much of the information we use to make investment decisions. Vivid language, or hype, influences the investors with contrarian positions. Unfortunately, investors tend to react too quickly to news stories. In fact, individual investors react to news that contains stale information. Or news that contains little important information—like company name changes. This short-term focus can be costly.

► Questions

1. How does one's level of social interaction influence the likelihood of investing in the stock market and the type of stocks purchased?
2. Give examples of investment club environments in which psychological biases are exacerbated. Give examples of environments or tools that help control the biases.
3. Does the use of vivid language moderate or exacerbate a price bubble?
4. Explain how investors have been fooled by investment name changes.
5. How did the media influence investors in the late 1990s to herd into marginal firms?

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Emotion and Investment Decisions

Traditional finance theory assumes that people make rational decisions to maximize their wealth in the face of risk and uncertainty. Because money is involved, reason and logic will overcome emotion and psychological biases, it would seem. Is this a good assumption? In reality, the situation might be just the opposite. Emotion might overcome reason when one is making a risky decision involving money.

► Feelings and Decisions

Psychologists and economists have examined the role of emotions in decision making. They call these feelings *affect*. They have found that unrelated feelings and emotions can impact decisions.¹ The term *unrelated* in this case means emotions that are not attributed to the decision. For example, you might be in a good mood because the sun is shining or because your favorite team just won. This good feeling can subsequently influence an investment decision. In addition, people who have stronger emotional reactions seem to let them impact their financial decisions more than others. Emotions interact with the cognitive evaluation process to eventually lead to a decision. At times, emotional reactions diverge from reason and logic to dominate the decision-making process. Indeed, the more complex and uncertain a situation is, the more emotions influence a decision.²

The central question then is: What is the relative importance of emotion and reason in decision making? It appears that emotions play a large role. For example, neurologist Antonio Damasio reported on patients who suffered damage to the ventromedial frontal cortices of the brain. This damage leaves intelligence, memory, and capacity for logic intact but impairs the ability to feel. Through various experiments, it was surmised that the lack of emotion in the decision-making process destroyed the ability to make rational decisions.³ Indeed, these people became socially dysfunctional. Damasio concluded that emotion is an integral component of making reasonable decisions.

Consider how psychologists study the effect of moods on decisions. They have their subjects write an essay about a sad or happy event in their lives. Reliving the event through their writing puts the subjects in bad or good moods, respectively. This mood appears to impact their predictions about the future. People who are in a bad mood are more pessimistic about the future than people who are in a good mood. That is, the subjects who are in a good mood give a

higher probability of good things happening and a lower probability of bad things happening.

In one study, the people who were in a good mood believed they had an 84 percent chance that “Within the next year, I will meet a new person who will come to be a very good friend.”⁴ The people who were in a bad mood believed that the chance of this happening was only 51 percent. Alternatively, when asked for the probability that “I will be involved in a major automobile accident within the next five years,” people who were in a bad mood thought the chance was 52 percent, and those who were in a good mood thought the chance was only 23 percent. People who are in a good mood view the future differently than people who are in a bad mood.

In addition to the importance of emotion, people are often insensitive to changes in the facts used in cognition. One such fact is the probability of outcomes. For example, people tend to treat the probability of winning a lottery of 1 in 10 million or 1 in 10,000 similarly when making a decision. Yet one has a 1,000 times higher chance of happening. In particular, the decision to take a gamble is relatively insensitive to large changes in probability when the gamble evokes strong emotions. In short, emotions drive the process of complex decision making.

► Feelings and Finance

Financial decisions are complex and include risk and uncertainty. Thus, emotions can play a role in investment decision making. Consider the month-long experiment conducted at the MIT Laboratory for Financial Engineering.⁵ Investors made trades and commented on their emotional state. The experimenters concluded that the investors who had the most intense emotional response to monetary gains and losses exhibited significantly worse trading performance. The emotional investor is a poor investor!

Background feelings, or mood, may also influence financial decisions. This is called the *misattribution bias*. That is, people often misattribute the mood (or affect) they are in to the financial decision at hand. If someone is in a good mood, he or she is more likely to be optimistic in evaluating an investment. Good (bad) moods will increase (decrease) the likelihood of investing in risky assets, like stocks. The misattribution bias has been examined in financial decisions in several ways.

Feelings Affect Investment Decisions Consider that an investor's decision to buy or sell a stock is based on expectations. The traditional finance view is embodied by the rational expectations model, which assumes that investor expectations are derived from using tools such as fundamental analysis and modern portfolio theory. These tools require making certain assumptions about the future. What growth rate will the firm achieve over the next three years? What is its expected return, expected variance, and expected correlation with other assets? Even the most sophisticated investors do not agree about which methods produce the most accurate assumptions. The rational expectations model requires that investors resolve these uncertainties in an unbiased and rational way. Yet evidence indicates that people make biased and nonrational choices driven by emotion and cognitive errors.

This is illustrated by an experiment conducted by Kuhnen and Knutson.⁶ They have subjects play a game in which they must continuously choose between investing in a risky asset with known probabilities for each outcome and a risk-free asset. They play for money. Before playing, positive, neutral, or negative emotions are induced through seeing a possibly provocative image and discussing it. They find that being induced with positive emotions leads to riskier choices and more confidence in those choices. One reason for this confidence is that they do not fully incorporate information that contradicts their prior choices. Negative emotions lead to more risk-averse choices.

Even those investors who use quantitative methods such as fundamental analysis can be influenced by their mood. Analysis includes educated guesswork about some assumptions. Some fundamental analysis techniques are more sophisticated than others, but they all involve assumptions about the future. To illustrate, consider the constant discount rate model taught to finance students around the world, $PV = D1/(k-g)$. Investors must estimate the constant growth rate, g . Given the influence of mood on risky and uncertain decisions, the expected value of the growth rate may become biased. In turn, this biases the value computed in the model.

For this example, assume that the annual return, k , is known to be 11 percent, and there will be a long-term dividend growth rate of 5 percent. An investor who is in a good mood might optimistically overestimate the growth rate to be 7 percent. This would cause the investor to believe the stock is worth 50 percent more than the belief of an unbiased investor. The optimistic investor might purchase the stock thinking it is undervalued when it is not.

Sunshine For the past several decades, psychologists have been documenting how the sun affects our decisions. A lack of sunlight has been linked to depression and even suicide. Without the sun, we feel bad. When the sun is shining, we feel good. This good mood makes us optimistic about our future prospects and impacts our decision-making process.

Even our financial decisions may be affected by sunshine. For example, you will probably leave a bigger tip for your server at lunch if it is sunny outside. You do

not even need to be outside to feel good about sunshine. One psychologist conducted an experiment at a large hotel where many of the rooms did not have windows.⁷ When a guest from one of these interior rooms ordered room service, the server would mention the weather outside. The server received an average tip of 18.8 percent on rainy days. This increased to 24.4 percent on cloudy days, 26.4 percent on partially sunny days, and 29.4 percent on sunny days. People give a tip that is more than 50 percent higher on sunny days than on rainy days.

Can the happy mood of a sunny day affect investors and the stock market? If the sunshine puts investors in a good mood, they will be more optimistic about future prospects. Therefore, investors are more likely to buy stock than to sell stock on sunny days. If the tendency to buy rather than sell affects enough investors, the stock market itself could be affected. Two financial economists examined this possibility by looking at stock market returns and the weather in the financial cities of the world.⁸ Specifically, they compared the daily return in 26 stock exchanges around the world to the weather in the 26 cities in which the stock markets were located.

These researchers used a weather scale with nine levels ranging from completely sunny to completely miserable. They found that the daily returns for sunny days are higher than the daily returns for non-sunny days. Indeed, the returns for the sunniest days are much higher than the returns for the most miserable days of weather. When they annualized the difference between the sunniest and worst days in all 26 cities, they found that sunny days outperformed miserable weather days by 24.6 percent per year.

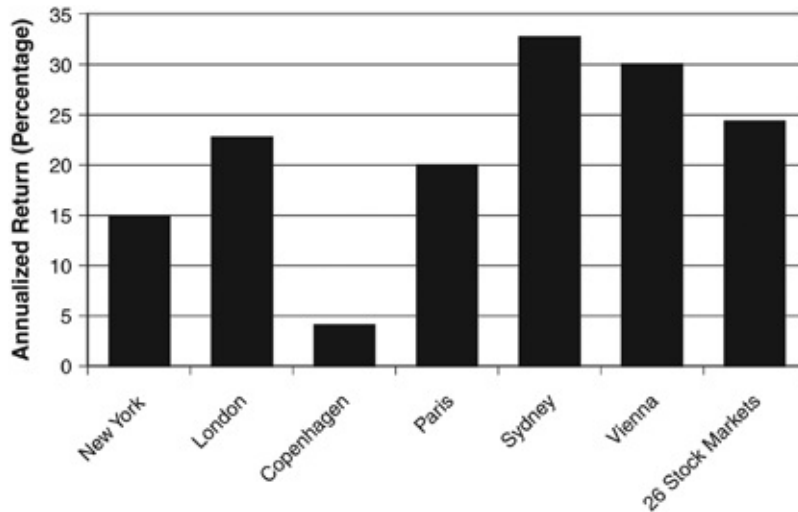


Figure 10.1 Annualized Difference in Return Between Sunny Days and Miserable Weather Days for Stock Markets Around the World

The annualized difference in returns between sunny and miserable days is shown for several cities in [Figure 10.1](#). The average for all 26 cities is also shown. Note that sunny days outperform on the New York Stock Exchange to the tune of 15 percent per year. Sunny days earn an annualized return of 22.1 percent over miserable days in London, 4.1 percent in Copenhagen, and 19.7 percent in Paris. Not every day is sunny or miserable; most days are in between. However, this illustrates that the sun affects investors and the market.

What type of investors finds their trading is impacted by the weather? People often blame the individual, retail-type investor as being influenced by their biases. This is usually true. But that does not mean that the professional investor doesn't often succumb to the same biases. Indeed, an examination of institutional investor trades along with a survey shows the mechanism for which these investors are impacted by weather.⁹ It appears that institutional investors are more critical of stock pricing during cloudy days. Thus, sunshine impacts an investor's level of risk aversion. When risk aversion is high, the investor is more likely to sell stock (or at least not to buy). When risk tolerance is low, a person is more likely to buy stock. Consistent with this argument, when the weather is sunny, institutions have a greater propensity to buy stock. A group of scholars from the University of North Carolina confirm this link between the weather and risk tolerance.¹⁰ Using an experiment to test financial risk tolerance, they find

that the weather impacts risk tolerance, but not intellectual ability. That is, good weather promotes risk taking. The sunshine puts people in a good mood and does not inhibit their ability to quantitatively assess choices. So, they continue to have the mental capacity to be critical, but the good mood seems to bias them toward making decisions through optimism and lower risk aversion.

Another way to examine the effect of sunshine on investor mood and behavior is to examine stock market returns by seasons. Psychologists have found that the decreasing amount of daylight during the fall and winter leads to depression in many people. This depression is called seasonal affective disorder (SAD). It is believed that 10 million Americans are afflicted with SAD and another 15 million suffer from a mild case of “winter blues.” Remember that people who are in a bad mood or in a depressed state are more critical and pessimistic, and people who are in a good mood are more optimistic. This leads to greater risk taking by people who are in good moods than by people who are in bad moods.

If the decreasing length of daylight affects many investors, they will take less risk. Three financial economists investigated this possibility by studying seven stock markets around the world: Australia, Great Britain, Canada, Germany, New Zealand, Sweden, and the United States.¹¹ They found that stock returns are lower during the fall when daylight decreases until December 21, the longest night of the year.

This effect is the strongest for stock markets that are farthest away from the equator (Sweden and Great Britain). Also, consistent with this idea is that the effect occurs during the spring for markets in the southern hemisphere (Australia and New Zealand). Again, it appears that daylight (or the lack of it) affects our mood. This mood also affects our investment decisions, our decision-making process, and the amount of risk we are willing to take.

Negative Emotions Just as investors can misattribute the positive feelings from sunlight, they can also misattribute the negative feelings from other factors in their environment. This section explores two examples: international sport competitions and the lunar cycle.

Historically, there has been a popular perception that lunar phases affect people's mood and behavior. The moon has long been associated with mental disorder. Indeed, the word "lunacy" links potential mental illness with the lunar cycle. Psychologists have reported correlations between the full moon and depressed mood. If the lunar cycle impacts investors, then they may value stocks less during a full moon relative to a new moon, thus causing a lower return around the full-moon period.

The returns in 48 stock markets around the world were investigated during the lunar cycle.¹² Stock returns were 3–5 percent lower per year during the seven days around the full moon than around a new moon. This effect is larger in emerging stock market countries than in developed countries. It is also stronger in stocks mostly held by individual investors. Investors do appear to misattribute the negative feelings associated with the full moon to their stock market decisions.

While the lunar cycle is predictable, the outcome of international sporting games is not. The outcome of soccer matches in the European or World Cups produce substantial mood swings in a large proportion of a country's population. Psychologists have found an increase in heart attacks, crimes, and suicides accompanying sporting losses. There is no evidence of positive behavior after wins. This is possibly because the reference point of many fans is that their team will win. Thus, a victory is a minimal deviation from the reference point, while a loss is a large deviation.

Two studies examined the stock market reactions to losses in popular sporting events.¹³ The first paper examined stock returns in 39 countries compared to more than 1,100 soccer match outcomes.

The day after a soccer game loss, the losing team's stock market declines an average 0.21 percent. If the game was a tournament elimination match, the decline is 0.38 percent (0.49 percent in the World Cup). The stock market reaction is stronger in countries that have historically performed well in soccer. Declines of 0.19 and 0.21 percent are found after cricket and basketball losses, respectively. No stock market impact was found after victories. The second paper examines the

returns of locally headquartered teams after American football games. The companies located in the losing city underperform those in the winning city over the day after the game by 0.0575 percent. This effect is double when the games are critical or the losing team was favored to win. Now you know, it really is more than just a game! These results suggest that the stock market reacts to sudden changes in investor mood.

Another study examines the stock market reaction after a popular TV series ends. Unlike the sports examples that are unpredictable, the ending of a TV series is heavily advertised. Yet, the day after the season finale, the stock market declines.¹⁴ People are sad about the end of their show—it is the end of a relationship people experience with the characters of the show. If enough people experience these negative emotions, the misattribution bias can impact the stock market. Goodbye Jerry Seinfeld. I'll miss you *Cheers*, *Friends*, and *The Sopranos*. Using a sample of 159 series finales that starts with the finale of *The Fugitive* of the 1960s to the more recent *The Closer* that ended in 2012, the study finds that the more people that watch the episode, the more the stock market declines the following day. The magnitude of this effect is small—an 8 basis point decline for every 20 percent increase in the finale viewership. But it shows how negative feelings of individuals can aggregate to a social mood.

The sports team and TV series finale examples illustrate how weak negative emotions can aggregate to temporarily impact financial markets. But there can be stronger and more pervasive negative feelings in society. For example, during a time of social stress, there will be more suicides in society. The number of suicides can proxy for strong negative social mood. Scholar Sujung Choi examined the relationship between monthly detrended suicide rates and monthly U.S. stock returns.¹⁵ High suicide rates in one month are associated with poor stock returns during the same month and during the subsequent month. Again, negative emotions are associated with poor stock market returns.

Optimism Optimism skews a person's beliefs and judgments. Optimistic people believe they are less likely than average to experience disease and divorce or to be a victim of crime. This belief can cause the optimist to take unnecessary risks.

Consider the average cigarette smoker. The fact that smoking is hazardous to your health comes as no surprise to smokers. Warnings are printed on every pack and on TV commercials. Everyone knows that smoking increases the risk of lung cancer, but smokers optimistically believe they personally are at low risk for the disease. After all, you would not be very intelligent if you thought you were at high risk and smoked anyway. To help preserve one's self-image of being intelligent, smokers are optimistic about their chance of not getting lung cancer, which allows them to continue a hazardous behavior.

Investors who are in a good mood can also suffer from optimistic decisions. That is, investors can also believe that nothing bad is likely to happen to their stock picks. Optimism affects investors in two ways. First, optimistic investors tend to do less critical analysis in making their stock decisions. Second, optimists tend to ignore (or downplay) negative information about their stocks. In other words, the optimistic investor holds fast to the belief that a firm is great, even when negative news about the firm is revealed—just as the smoker downplays the risk of getting cancer after reading the warning label.

The price of a stock is frequently set by the optimistic investors. If many investors are optimistic about a stock and many are pessimistic, the price of the stock will be driven by the optimists. This is because the pessimists stay on the sideline, while the optimists buy. The optimists drive up the stock price with their buying. This makes the pessimists even more pessimistic, but staying on the sideline does not affect the price. A stock will have a large number of optimistic and pessimistic investors (as opposed to mostly unbiased investors) when there is a large degree of uncertainty about the prospects of the stock. The prospects of large, well-established firms have less uncertainty, so their stocks prices are generally more reflective of actual prospects than of optimistic prospects. For example, the business potential of General Electric, Procter & Gamble, and Intel are well known and leave little room for a high degree of optimism and pessimism. For firms with a high degree of uncertainty, optimists tend to set the stock price until that uncertainty is resolved. This resolution usually includes a downward revision of optimism and a decline in the stock price.

Rampant optimism, or irrational exuberance, can be found in the stock market.

Consider the case of Palm and 3Com. 3Com was a profitable firm that sold computer network systems and services. One of the products it developed in its Palm subsidiary was the handheld computer known as the Palm Pilot. 3Com decided to spin off Palm into its own company. The plan was to issue 4 percent of the shares of Palm in an initial public offering (IPO), sell 1 percent of the shares to a consortium of firms, and distribute the remaining 95 percent of the Palm shares to 3Com stockholders. On March 2, 2000, 3Com sold the 5 percent of Palm in the IPO. The other 95 percent of the Palm stock was to be distributed later in the year as 1.5 shares of Palm for every 1 share of 3Com stock owned. So, if you owned 1 share of 3Com stock, after the distribution, you would own 1.5 shares of Palm and still own 1 share of 3Com.

By the end of the IPO day, the newly issued shares of Palm traded at \$95.06. Because 1 share of 3Com would receive 1.5 shares of Palm, the 3Com stock should have been worth a minimum of \$142.59 (this is equal to $1.5 \times \$95.06$) from the value of the Palm shares alone. 3Com's non-Palm operations also had value. These businesses were earning \$750 million in annual profits for 3Com,¹⁶ so the 3Com stock price should have been much higher than \$142.59. However, 3Com stock closed at only \$81.81 per share that day.

If you wanted to own Palm stock, you could have bought 3Com stock and gotten the Palm stock for an effective price of \$54.54 (which is equal to $\$81.81 \div 1.5$) per share and owned the 3Com stock for free. Either 3Com stock was priced too low or Palm stock was priced too high. Because 3Com was a larger, better-established firm and Palm was a new firm in an uncertain environment, it is likely that optimistic investors affected the Palm stock. All relevant information about Palm and 3Com was readily available before the IPO. The day after the IPO, the *Wall Street Journal* and the *New York Times* ran articles highlighting the strange mispricing. Yet the mispricing continued for months. The value of the embedded Palm stock in the 3Com stock continued to be worth more than the 3Com stock itself for two more months (until May 9). Again, optimistic investors ignored, or minimized, bad news about their firms.

Although the 3Com/Palm example is interesting, it is not unique. For example, HNC Software spun off Retek on November 17, 1999; Daisytek spun off PFSWeb

on December 1, 1999; and Methode Electronics spun off Stratos Lightwave on June 26, 2000. In all three cases, optimistic investors drove the new company's stock price up. Just like 3Com and Palm, the price of the parent company's stock was less than the embedded value of the spin-off firm's stock price. These three other cases shared another thing with 3Com and Palm. In each case, the new company's stock price fell by 50 percent or more during the ensuing six months.

Other similar examples can be cited. Some companies do not entirely spin off a new company; that is, sometimes the parent company will keep some stock of the subsidiary instead of distributing it to the shareholders. The optimism about the subsidiary can get so great that the price gets run up and mispricing results between the parent and the subsidiary. For example, in September 1999, Flowers Industries owned 55 percent of the shares of Keebler Foods. The stock price of Keebler was such that its total market capitalization (number of shares of stock times the stock price) was \$2.50 billion. Because Flowers owned 55 percent of Keebler, its ownership was worth \$1.38 billion, yet the total market capitalization of Flowers was only \$1.36 billion. Flowers' stock price was such that its market capitalization was lower than the holdings of just one of its assets, Keebler. The value of the other assets was approximately \$1 billion. Clearly, either Keebler was severely overpriced or Flowers was underpriced. This phenomenon has occurred to several firms and illustrates the price inflation of stocks driven by optimism.¹⁷ Buying a stock whose price is driven up by optimism usually leads to losses as the optimism unwinds—and eventually, the optimism always unwinds.

This investor mania caused a price bubble in the 1990s. In 2000, the bubble burst. The technology-laden NASDAQ (National Association of Securities and Dealers Automated Quotation) composite stock index experienced a 54 percent decline from its peak in March to its low in December 2000. Internet-focused stock indexes such as the TSC Internet Sector Index declined by 79 percent over the same period. In comparison, the Dow Jones Industrial Average increased by 4 percent.

► Sentiment

The previous examples of emotions impacting the market can be characterized as either the social misattribution of good and bad feelings to stock market optimism and pessimism or the specific excitement of speculating on an individual company. However, many people have observed that the general level of optimism and pessimism, or social mood, changes over time.¹⁸ Indeed, it appears that investors tend to be most optimistic at the market top and most pessimistic at the market bottom (see the representativeness bias in [Chapter 7](#)). The investment industry refers to this fluctuating social mood as market *sentiment*. If individual investors get too optimistic (pessimistic) during market tops (bottoms), then knowing the general sentiment might allow for the prediction of returns.

An example of seasonal optimism in society occurs during the month-long period of Ramadan in Muslim countries. Ramadan is a time for fasting, reflection, self-reformation, giving, worship, social awareness, and a closer relationship with fellow Muslims around the world. This enhances their satisfaction with life and encourages optimistic beliefs. Three scholars investigated whether this positive sentiment impacts the stock returns in 14 Muslim countries.¹⁹ They show that over a 19-year period, Ramadan is associated with an average return of 3.17 percent (my computation from their results). This compares to an average total return during the other 11 months of the year of 3.96 percent. This suggests that nearly half of the annual return occurs in just the one month of Ramadan!

There are many measures of investor sentiment. Consider the discount to closed-end mutual funds. A closed-end fund is similar to its more popular cousin, the open-end fund, except that its shares trade on the stock exchanges. Because the stocks held in the closed-end fund portfolio are known, the value of each fund share is also known and is called the net asset value (NAV). Interestingly, closed-end funds generally trade for prices below their NAV. The size of the difference,

or discount, is a measure of sentiment. When individual investors are optimistic, the demand for these funds increases and the discount declines. Pessimistic investors sell the funds, and the discount increases. Other popular measures are the number of IPOs being conducted and the magnitude of their first-day return. These values are higher when sentiment is high.²⁰

The argument for why investor sentiment should not impact market prices is that wealthy and smart investors look to trade against moody investors to capture the mispricings they create as profits. This process is known as *arbitrage*. However, arbitrage is difficult to do in stocks that are hard to value. Malcolm Baker and Jeffrey Wurgler propose that the impact of investor sentiment will be most noticeable in these speculative stocks.²¹ Companies that might meet this definition are ones that are small, young, volatile, unprofitable, distressed, or have extreme growth potential. They examine the influence of investor sentiment on these stocks by measuring the sentiment at the beginning of the year and reporting monthly stock returns during the following year. They hypothesize that the returns of these speculative stocks will be low (high) after high (low) measures of sentiment.

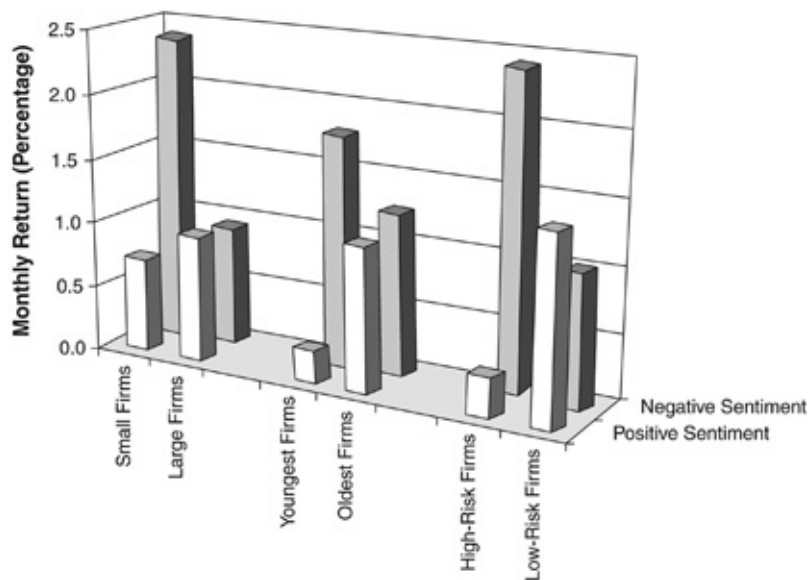


Figure 10.2 Monthly Returns After Positive and Negative Sentiment Levels for Speculative and Non-speculative Firms

Figure 10.2 shows the average monthly return during the year after positive (or

high) sentiment and after negative (or low) sentiment. Baker and Wurgler combined six different sentiment measures to create one sentiment index from 1963 to 2001. Notice from the figure that the speculative stocks (small companies, young companies, or risky companies) all have much higher monthly returns after beginning the year with negative sentiment than with positive sentiment. For example, small stocks earn 2.37 percent per month after a low sentiment measure and only 0.73 percent per month after a high measure. This large difference is not seen in large stocks. The youngest firms earn 1.77 percent per month after beginning the year with low sentiment and only 0.25 percent when starting with high sentiment. The returns for the most volatile firms are 2.41 and 0.30 percent per month, respectively. The returns of older firms and low-risk firms do not exhibit this pattern.

These results suggest that optimistic investors bid up speculative stocks to overvalued levels. When the optimism becomes high, so does the stock price. Eventually, the optimism reaches its peak. From these high levels, the stocks subsequently earn a lower return. Pessimistic investors avoid speculative stocks, which fall to a low level. As the sentiment gets more negative, stocks decline. Scholar Diego García examines the tone of the words in two financial news columns of the *New York Times* over a century.²² He shows that when the fraction of the words in the articles is more negative, the stock market declines the following day. That is, negative sentiment leads to lower stock prices. The market reaches the bottom when sentiment is very pessimistic, thus leading to long-term higher returns. Therefore, speculative stock prices are more sensitive to sentiment than firms with long histories, stable dividends, and tangible assets.

► Market Bubbles

The more things change, the more *people* stay the same. Market bubbles are not a recent phenomenon, nor are they uncommon.

One of the most impressive market bubbles occurred in Holland in the 1630s.²³ What makes that bubble so amusing is that the highly sought-after commodity was the tulip bulb. Over a five-year period, tulip bulb mania inflated bulb prices to the point where one bulb was worth ten times a yoke of oxen. A tulip bulb costing nearly \$100,000? Then an out-of-town sailor inadvertently popped the tulip bulb price bubble. Mistaking the bulb for an onion, he ate it. Wondering whether the bulbs were worth the high prices, panic erupted; within a week, the bulbs were almost worthless.

Modern market bubbles have common elements. Given the statement that follows, how would you fill in the blank?

We are in a new era. _____ has ushered in a new type of economy. Those stuck in the old ways will quickly fall away. Traditional company valuation techniques do not capture the value of this revolution.

You probably answered “the Internet.” However, if you lived in 1850, you would have said “the railroad.” If you lived in the 1920s, you might have said “the Federal Reserve System” or “the radio.” In the mid-1950s, the answer would have been “the New Deal.” Even as recently as 1990, you might have said “biotechnology.” In each case, this rationalization accompanied a great bull market and preceded a great decline. The point is that price bubbles are not uncommon, nor is each one unique.

► The Thrills of Investing

Some people may invest or trade because they like to do so. It provides an excitement or is entertaining. Indeed, some people may even get a thrill from trading. For these individuals, trading is similar to gambling. The desire to gamble has deep roots in the human psyche and its evidence can be traced back centuries. The investing world has ripe opportunities for gambling. Securities like stocks have risk, uncertainty, and the chance for making large sums of money. Thus, people could behave like gamblers and seek sensation through their brokerage accounts.

What kind of investment activities might we expect to see from a sensation seeker? Gamblers like to make active decisions. Being an active participant is important to the seeking of sensation. In a brokerage account, that would lead to lots of trading. In addition, those looking for entertainment from trading would seek out stocks with lottery-like characteristics. These characteristics include a low price and a high return volatility. That is, gambles like the lottery have a very low cost and a very low probability of winning a large amount of money. Investors seeking entertainment might try to find stocks with those characteristics. Three interesting studies explore sensation-seeking investors and their behavior.

Decades of research shows that the most common lottery player is a young, poor, less-educated, single man who is from a minority group, lives in an urban area and has a non-professional job. Alok Kumar studied U.S. investors' brokerage accounts and found that these same socio-economic characteristics describe those who seek lottery-type stocks.²⁴ In addition, people in states with a lottery and who live in areas with a higher concentration of Catholics also have a higher propensity for lottery-type stocks. Investors in Germany were surveyed as to how much they enjoyed investing and gambling. Those who enjoyed them more traded twice as much as non-gamblers.²⁵

Professors Mark Grinblatt and Matti Keloharju studied investors in Finland. Their unique dataset allowed them to merge stock brokerage data with other databases.²⁶ For example, they knew how many speeding tickets the investors had received and if the investor was male, and they had access to psychology tests given during mandatory military service. Investors who are sensation seeking in one area, like playing poker, tend to also be sensation seeking in other areas. Thus, they compared the activities of those investors who are prone to sensation seeking (a higher number of speeding tickets) with those who are not. After controlling for other investor characteristics, they found that sensation seekers trade more than other investors. They seem to derive some entertainment from trading.

Most of this chapter has been about how emotions impact peoples' decisions in investing and other economic events. Interestingly, it turns out that some people invest to elicit certain emotions. They trade specific types of stocks to feel the sensations associated with gambling. In order to protect a sensation-seekers' wealth, that person might set up a "play" brokerage account with a small portion of the portfolio. That way, they can satisfy their need for entertainment and yet protect the larger portion of their portfolio from bad, gambling-like decisions.

► Summary

Emotions are an important part of the decision-making process. This is especially true for decisions that involve a high degree of uncertainty, such as investment decisions. Sometimes, emotion can overcome logic in this process. Too much optimism leads investors to underestimate risk and overestimate expected performance. Optimistic investors tend to seek good-story stocks and be less critical. Pessimistic investors tend to be more analytical. Extended, extreme optimism can cause price bubbles. On the other hand, some sensation-seeking investors look for the gambling-like emotions from excessive trading.

► Questions

1. How might being in a good mood or bad mood influence an investor's decisions?
2. How can optimism and pessimism affect the results of quantitative asset pricing?
3. Explain the misattribution bias and its effect on investment behavior.
4. Design an investment strategy to profit from the impact of investor sentiment on the market.
5. What kind of investing activities would you expect from a person prone to sensation seeking?

► Notes

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Self-Control and Decision Making

Three years of losses often turn investors with 30-year horizons into investors with 3-year horizons; they want out.

Kenneth Fisher and Meir Statman¹

A common adage on Wall Street is that the markets are motivated by two emotions: fear and greed. Indeed, this book suggests that investors are affected by these emotions. However, acting on these emotions is rarely the wise move. The decision that benefits investors over the long term is usually made in the absence of strong emotions. In fact, investors face a lifelong struggle between decisions that make the present more enjoyable and ones that make the future more enjoyable. Many decisions require balancing this trade-off. “Do I read this chapter now or later?” “Do I purchase a new stereo or invest the money for the future?”

Richard Thaler and Hersh Shefrin describe the self-control problem as the interaction between a person’s two selves: the planner and the doer.² The doer wishes to consume now instead of later and procrastinates on unpleasant tasks. The planner wishes to save for later consumption and complete unpleasant tasks now. This conflict between desire and willpower occurs because people are influenced by long-term rational concerns and by more short-term emotional factors.

Fortunately, people recognize the fact that they are susceptible to weak willpower and spur-of-the-moment decisions. Our society is full of examples of people who

recognize that they need help with self-control.

Common examples are those who utilize weight-loss clinics, Alcoholics Anonymous, Narcotics Anonymous, and similar organizations.

► Short-Term Versus Long-Term Focus

People like to receive rewards early and put off unpleasant tasks. However, this attitude depends on the circumstances. Consider the following example.³ If people are asked on February 1 whether they would prefer to do seven hours of an unpleasant task on April 1 or eight hours of the unpleasant task on April 15, people will say they would prefer to do the lesser amount of work on April 1. However, if given the same choice on the morning of April 1, most people will decide to delay the work until April 15, even though it means doing more total work. When making decisions involving the present, people often procrastinate, even when it causes more work later.

This attitude also can affect investment decisions. For example, most people would rather get \$50 immediately than \$100 in two years, forgoing a 41 percent annual return. Alternatively, almost no one prefers \$50 in four years to \$100 in six years even though this is the same choice, albeit four years into the future.⁴ People seem to view the present differently from how they view the future. This leads to strong desire and weak willpower.

► Controlling Yourself

Most people want to maintain self-control and implement decisions that provide benefits over the long term. However, they often recognize that their desire is stronger than their willpower; therefore, people use many techniques to help strengthen their willpower. I categorize these techniques into two groups: rules of thumb and environment control.⁵ These techniques help people reduce desire and increase willpower.

People implement rules of thumb to control their behavior. They rationally create these rules in the absence of emotions during times when willpower is high. During situations filled with high emotion and desire, people rely on these rules to remind them how to exert willpower. Consider these common rules:

1. People control spending by—fighting the urge to splurge.
2. Recovering alcoholics drink—not one drop.
3. Retired people control spending by the rule—don't touch the principal.
4. Employees contribute to their 401(k) plans by the rule—save much, don't touch.
5. Investors try to control trading behavior with—buy low, sell high.
6. Investors try to maintain a long-term perspective during bear markets with—stay the course.

People also control their environment to improve willpower. Common ways to control the environment are to remove desired objects from the area or avoid situations that are likely to cause self-control problems. Common examples include the following:

1. People on a diet do not keep cookies in the house.
2. Gambling addicts avoid going to Las Vegas.
3. People who are always late set their watches a few minutes fast.
4. People who have trouble getting out of bed place the alarm clock across the

room to force themselves to get up.

People are often willing to incur costs in order to maintain self-control. For example, professional athletes earn the vast majority of their income during a short time period. After earning millions of dollars, some end up bankrupt because they were unable to control their desire to spend. To improve willpower, some athletes hire agents to impose limits on their consumption.

As another example, consider the average smoker. Most smokers recognize that they should not smoke too much (or at all). In order to limit their smoking, most smokers buy cigarettes by the pack. Purchasing cigarettes by the carton is much cheaper; however, the easiest way to control the number of cigarettes smoked is to control the number available. Although this technique is more expensive, smokers are willing to pay the extra cost in order to control their environment in the pursuit of stronger willpower.

► Saving and Self-Control

Saving for retirement is difficult because it requires self-control. In 1971, 51 percent of retirees had no income from financial assets. Only 22 percent of the retirees earned investment income that amounted to more than 20 percent of their total income. Most of these retirees succumbed to the desire for current consumption during their peak earning years and procrastinated when it came to saving for the future.⁶

People find it psychologically easier to save from a lump-sum payment than from regular income.⁷ Consider two people who each earn \$25,000 per year. The first earns the \$25,000 as 12 monthly payments. The second person earns \$20,000 in 12 monthly payments and then receives a \$5,000 bonus paid all at once. Assuming that both wage earners incur the equivalent amount in expenses, they should save the same amount for retirement. However, it is more likely that the person with the bonus will save more. Coming up with the disposable income to save is easier with a lump-sum payment (or cash windfall). Saving money from a monthly salary requires much more self-control.⁸ This might be why the savings rate of countries like Japan is higher than that of the United States. A higher percentage of income in Japan is from the year-end bonus. However, a simple environmental control of automatic payroll deduction or an automatic investment plan can make saving easier.

This also explains people's propensity for giving interest-free loans to the government. That is, most people overpay their taxes throughout the year and then receive a tax refund in the spring. In 2014, 118 million Americans overpaid their taxes during the year and received a total of \$373.5 billion in refunds. That is a lot of forgone interest.

People can easily adjust their withholding rate and retain more of their income during the year. However, many prefer to overpay. In an experiment using MBA

students and a case of a hypothetical wage earner, 43 percent of the 132 students chose to pay more than the minimum required quarterly tax payment.⁹ People recognize that a \$50 increase in their monthly income is likely to be spent. They know they are more likely to save the equivalent, a \$600 refund.

► 401(K) and IRA Plans

The IRA (Individual Retirement Account) and the corporate 401(k) pension plans are two savings innovations that have helped people save and invest for the future. These plans are simple to implement and provide an immediate tax reduction. In addition, the large penalties for early withdrawal add the incentive needed to keep the money invested for retirement. Most people who invest in an IRA or a 401(k) plan contribute again the following year;¹⁰ that is, they form a habit to help their willpower.

It is clearly rational to contribute to an IRA. The investment earnings in an IRA grow tax deferred because no income or capital gains taxes are paid on the profits each year. Instead, income taxes are paid on the money that is withdrawn from the IRA during retirement. Therefore, it is best to contribute the money to the IRA as soon as possible to let it grow tax deferred for as long as possible. To get the tax deduction for the 2017 tax year, you should contribute on January 1, 2017, to get the maximum time benefit of the money growing. However, people do not have the self-control to invest early in the year. The tax laws allow contributions made as late as April 15, 2018, to count as a 2017 tax-year IRA. Indeed, most taxpayers who contribute to an IRA will not contribute until 2018 for their 2017 IRA.¹¹ They need the deadline to exert self-control.

Contributing to your 401(k) plan is also considered the smart thing to do. However, since the inception of the 401(k), the most difficult aspect for plan administrators has been getting employees to begin contributing because people procrastinate. The more important the decision is, the more likely people are to procrastinate.¹² Employees often believe they can make a better decision if they just take a little more time to analyze the choices. The continuous delay costs the employee the two most important factors in building a retirement nest egg: time and invested capital.

The problem got worse when companies began increasing the number of options available in their 401(k) plans. These plans started with three or four choices (typically company stock, money market, bond fund, and stock fund). However, many plans now adopt mutual fund families with hundreds of different funds to select from. Having more options available induces more procrastination. In order to help employees improve their self-control, some companies now automatically sign up employees for contributions when they are first hired. That way, although the employee procrastinates on how to change the automatic contribution defaults, he or she is still contributing and investing.

► Self-Control and Dividends

A long-standing puzzle in traditional finance has been why individuals have a strong preference for cash dividends. This is especially puzzling considering that dividend income is taxed that year, but capital gains aren't taxed until they are realized.

Consider the example demonstrated in [Table 11.1](#). An investor owns 1,000 shares of a \$100 stock for a total value of \$100,000. If the stock pays a 1 percent dividend, then the investor receives \$1,000, and the stock price falls to \$99 per share. The 1,000 shares are now worth \$99,000 because the investment paid out 1 percent of its value. The decrease in the stock price is the amount of the dividend paid. However, if the investor owes 20 percent in dividend tax, he keeps only \$800 after taxes. In sum, the investor ends up with \$800 in cash and stock worth \$99,000.

Now consider the alternative. Assume that the stock does not pay a dividend. If the investor wants some cash, he must create his own dividend by selling ten shares at \$100 per share to receive the \$1,000 in proceeds. This is called a *homemade dividend*. The investor is now left with 990 shares of a stock worth \$100 each for a total of \$99,000. If the stock sold has no capital gains liability, then the investor owes no taxes and keeps the entire \$1,000 in cash. Note that the investor is better off creating his own dividend. If the stock had a cost basis of \$50 per share and capital gains are taxed at 20 percent, then \$100 is owed in taxes. The investor is still better off making his own dividends.

[Table 11.1](#) Real Dividends Versus Homemade Dividends

	Receive Dividend	Homemade Dividend
Starting Number of Shares Owned	1,000	1,000
Beginning Price Per Share	\$100	\$100

Beginning Stock Value	\$100,000	\$100,000
Per-Share Dividend	\$1	\$0
Pretax Dividend Income Dividend by Selling Ten Shares	\$1,000	
Selling Shares Pretax Income		\$1,000
Ending Number of Shares	1,000	990
Price Per Share	\$99	\$100
Ending Stock Value Taxes	\$99,000	\$99,000
Dividend Tax (20% rate)	\$200	\$0
Capital Gains Tax (20% rate, 50% gain)	\$0	\$100
After-Tax Income	\$800	\$900

The investor who wishes to maximize wealth and cash flow should seek income through homemade dividends rather than cash dividends. However, people generally prefer cash dividends. This behavior is irrational in traditional finance but can be explained by investor psychology.

Mental accounting causes investors to separate investments into different mental accounts. In investing for the income mental account, investors buy high-dividend stocks, bonds, and annuities. A different mental account is used for capital gains.

These mental accounts are especially useful for investors who need to exert self-control. Retired people may recognize that their wealth needs to outlive themselves; that is, they don't want to outlive their money. Because they might be tempted to spend too much money, they enact a common rule of thumb to help with self-control: never touch the principal. This rule is a helpful reminder to avoid over-spending. However, it can also inhibit the kind of creative thinking that increases income, such as the use of homemade dividends.

► Beating the Biases

Many biases have been discussed in this book. This section suggests strategies for overcoming the psychological biases.

Strategy 1: Understand the Biases This is the purpose of the previous chapters of this book. Recognizing the biases in yourself and in others is an important step in avoiding them.

Strategy 2: Know Why You Are Investing Many investors largely overlook this simple step of the investing process. Most people have only some vague notion of their investment goals. “I want a lot of money so I can travel abroad when I retire.” “I want to make the money to send my kids to college.” Sometimes, people think of vague goals in a negative form. “I don’t want to be poor when I retire.” These vague notions do little to provide investment direction, nor do they help you avoid the psychological biases that inhibit good decision making.

Establishing specific goals and ways to meet them is important. Instead of a vague notion of wanting to travel after retirement, define what that means and how much money it will require. For example:

A minimum of \$75,000 of income per year in retirement would allow me to make two international trips per year. I will receive \$20,000 per year in Social Security and retirement benefits, so I need \$55,000 in investment income. Investment earnings from \$800,000 would generate the desired income. I want to retire in ten years.

Having specific goals gives you many advantages. For example, by keeping your eye on the reason for investing, you will focus on the long term and “the big picture,” be able to monitor and measure your progress, and be able to determine whether your behavior matches your goals.

Strategy 3: Have Quantitative Investment Criteria Having a set of quantitative investment criteria allows you to avoid investing on emotion, rumor, stories, and

other psychologically based biases. This is important because investors seem to be attracted to attention-grabbing information like advertising. Mutual funds that advertise more than other funds receive more new money flow from investors. However, their annual expenses are higher because of the 12B-1 fee charged to fund shareholders for advertising.¹³ So, while investors are attracted to funds that advertise, they are simultaneously picking higher-expense funds, which is negatively related to performance.

Before buying a stock or mutual fund, compare its characteristics to your criteria. If it doesn't meet your criteria, don't invest in it.

Consider the Klondike Investment Club of Buffalo, Wyoming, discussed in [Chapter 8](#). Their number one ranking stems in part from the fact that they make buying decisions based only on an acceptable research report. Their criteria keep them from falling prey to their psychological biases. On the other hand, the California Investors Club's lack of success is partially due to their lack of criteria. Their decision process leads to buying decisions that are ultimately controlled by emotion.

Even though quantitative criteria are used, qualitative information also can be important. Information about the quality of the firm's management or the types of new products under development can be useful. If a stock meets your quantitative criteria, then you can examine these qualitative factors.

[Strategy 4: Diversify](#) It is not likely that you will diversify in a manner suggested by modern portfolio theory, as discussed in [Chapter 6](#). However, if you keep some simple diversification rules in mind, you can do well.

- *Diversify by owning many different types of stocks.* You can be reasonably well diversified with 15 stocks that are from different industries and are of different-size companies. One diversified mutual fund would accomplish this goal, too. However, a portfolio of 50 technology stocks is not a diversified portfolio; neither is one that includes 5 technology mutual funds.
- *Own very little of the firm you work for.* You already have your human capital invested in the firm; that is, your income is dependent on the

company. Therefore, diversify your “whole self” by avoiding the company in your investments.

- *Invest in bonds, too.* A diversified portfolio should include some bonds or bond mutual funds.

Diversifying in this way helps investors avoid tragic losses that can truly affect their lives. In addition, diversification is a shield against the psychological biases of attachment and familiarity.

Strategy 5: Control Your Investing Environment If you are on a diet, you should not leave a dish of M&M candies on the table. Similarly, if you want to overcome your psychological investment biases, you should control your investment environment.

So many people are frequently checking their stocks at work that companies are limiting Internet access to employees so they are not distracted. To control your environment, you need to limit the activities that magnify your psychological biases. Here are some ways to help you control your environment:

- *Check your stocks once per month.* By checking your stocks once per month instead of once per hour, the behavioral reactions of snakebite, seeking pride, and playing with the house’s money will be inhibited.
- *Make trades only once per month and on the same day of the month.* Pick one day of the month, such as the 15th, and place buy-and-sell trades only on that day. This will help you avoid the misconception that speed is important. Speed is only important if you want to chase a stock on a rumor and get into it just before its bubble bursts. On the other hand, trading once per month helps overcome overconfidence trading.
- *Review your portfolio annually to see how it lines up with your specific goals.* When you review your portfolio, keep in mind the psychological biases of status quo, endowment, representativeness, and familiarity. Does each security in your portfolio contribute to meeting your investment goals and maintaining diversification? Keep records so that you can overcome cognitive dissonance and other memory biases.

Strategy 6: Reminders People have limited attention. We cannot concentrate on all the important things in our life at the same time. Thus, it is important to occasionally bring our investment habits and goals from the subconscious to the conscious. Periodic message reminders can be effective.

An experiment with banks in Bolivia, Peru, and the Philippines used monthly messages to remind customers of their savings goals.¹⁴ These reminders helped their clients meet their goals. These messages can be very simple, like “don’t forget your deposit this month,” or “remember that house you are saving for.” These simple reminders trigger the memories and thoughts of the more sophisticated goals. The object of these reminders is to bring attention to important investment goals. There is risk that repeated reminders will eventually be “tuned out” over time. Thus, mix up your reminders. Some should be aspirational reminders of your goals for your future. Others can help remind you to check your progress toward your goals or review your portfolio. And of course, reminders to beat your biases! With modern technology, you can set up your own reminders through your smart phone or through events on a calendar.

► Additional Rules of Thumb

Although many people understand these self-help concepts, they still fail to exert the effort needed to implement them. Instead, they attempt to cope by adopting simple heuristics (or rules of thumb).¹⁵ Consider implementing these rules to shield yourself from your own psychological biases:

1. Avoid stocks that are selling for less than \$5 per share. Most investment scams are conducted in penny stocks.
2. Chat rooms, message boards, and Twitter advice are for entertainment purposes only. It is on these boards that your overconfidence is fostered, familiarity is magnified, and artificial “social consensus” is formed.
3. Before you place a trade on a stock that does not meet your criteria, remember that it is unlikely that you know more than the market. Investing outside of your criteria implies that you have some informational advantage over others. Are you sure you know more?
4. Strive to earn the market return. Most active trading is motivated by the desire to earn a higher return than everyone else is. The strategies for earning a higher return usually foster psychological biases and ultimately contribute to lower returns. However, the strategies for earning the market return, like fully diversifying, are successful because they inhibit your biases.
5. Review the psychological biases annually. This action will reinforce the first strategy of the chapter.

Successful investing is more than just knowing all about stocks. Indeed, understanding yourself is equally important. “Knowledgeable” investors frequently fail because they allow their psychological biases to control their decisions. This chapter illustrates the self-control problem and proposes some strategies for overcoming the psychological biases.

► Maybe an Advisor is Needed?

As this book has illustrated, there are many biases, emotions, and cognitive errors that lead people to make serious investment mistakes. These problems are hard to control, especially for the “part-time” investor. Would a financial advisor help?

There are several issues with using a financial advisor. First, advisors are people too and may also suffer from many of these same psychological biases. Second, people tend to shy away from advisors who charge a fee and then give unbiased advice. I’ll call this the Suze Orman effect. But financial advisors need to earn a living and get paid for their advice, so many must then get compensated by earning sales charges when they put clients in mutual funds that charge sales loads. This allows for potential conflicts of interest for the advisors.¹⁶ Do they recommend investments that are best for their clients or that give them the most compensation? Lastly, many investors don’t seem to believe that advisors will provide useful advice.

Indeed, scholars recently tested that last sentence. They offered free and unbiased financial advice to clients of one of the largest brokerages in Germany.¹⁷ The advice focused on improving portfolio efficiency through better diversification and it was generated from a mean-variance optimizer targeted to the client’s level of risk aversion. The products recommended were mostly combinations of exchange traded funds and the brokerage agreed to waive commissions for any client following the advice. A total of 8,195 customers were offered the free advice. Only 5 percent, or 385, people accepted the offer to hear the advice. The advice offered these 385 was good. It recommended lower allocations to German stocks (home bias) and greater investment in foreign stocks and other asset classes. The researchers followed the recommended portfolios and the actual investor portfolios after the recommendation was made. The post-advice average return was 24.8 percent for the recommended portfolios versus 21.2 percent for the actual portfolios. The standard deviation was only 9.6 percent for the

recommendations versus 15.0 percent for the actual portfolio. However, of the 385 people who accepted the offer and heard the advice, only 125 actually took some part of the advice. Clearly, many people are simply not interested in hearing or taking professional financial advice.

► Choice Architecture

This book has shown that people don't often know their own preferences. Even when they do, they are often unclear and ill-formed. Their decisions are influenced by cognitive errors, framing effects, mental shortcuts, social influences, and other psychological biases. When people are given the freedom of choice in financial decisions, they often choose badly. Should the government, corporations, and other institutions choose for them?

This is a question of ideology. Libertarians advocate the maximization of individual liberty, thus they value the freedom of choice. On the other hand, paternalism is the attitude that an authoritative figurehead should make decisions on behalf of others for their own good. Thus, Richard Thaler and Cass Sunstein's promotion of libertarian paternalism seems like an oxymoron. In their book, *Nudge*, they argue that private and public institutions should attempt to guide people's decisions and behavior in a direction that will improve their own welfare.¹⁸ That is, peoples' choices should be deliberately framed, called choice architecture, in a manner that steers them to making choices that will make them better off. Yet in the end, each person is free to choose. Psychologically designed choices have shown to change people's decisions on eating healthier food, become an organ donor, quit smoking, pay taxes, improve energy efficiency, etc. Indeed, Cass Sunstein suggests that a country should have a Council of Psychological Advisors, like the traditional economic advisors.¹⁹ Below are two examples of savings programs that are designed to exploit behavioral biases for the good of the person.

[Save More Tomorrow](#) Most discussions of psychological biases, including those in this book, focus on how the biases are problems for investors and how they can be overcome. However, by reorganizing the investment process, some biases can be used to help investors. For example, instead of setting up a 401(k) plan process where social and psychological influences inhibit employees from

contributing, it might be better to set up the process in ways such that the influences encourage employees to contribute.

The status quo bias causes employees to procrastinate in making their retirement plan decisions. Indeed, many procrastinate so long that they never participate in the plan. Instead of requiring the new employee to take action to enroll, enroll the employee automatically and require the person to take action to disenroll.²⁰ Instead of exerting an effort to start the participation, employees participate automatically. Those not wishing to participate must make the effort to disenroll. An automatic enrollment policy in a 401(k) savings plan results in substantially more employees participating in the pension plan, although most just stay at the default level of contribution and asset allocation. One problem with this approach is that some of the employees would have participated without the automatic enrollment. In addition, they would have contributed a higher amount and chosen a more aggressive asset allocation than the default money market fund, but they do not change the default allocation because of the status quo bias. Therefore, this automatic enrollment of employees helps many but might harm some.

Richard Thaler and Shlomo Benartzi proposed a four-step approach that they call Save More Tomorrow (SMT) that overcomes several psychological biases.²¹ They suggested that employees who are not contributing to their 401(k) plan can begin to do so by agreeing to the following plan. First, the employee is asked to agree to the plan well in advance; that is, the decision does not have any immediate ramifications. Second, the plan starts by having the employee agree to begin contributing at his or her next pay raise with a small contribution rate, such as 2 percent. By combining a pay raise with the contribution, the employee still sees a small increase in pay but also begins contributing. Third, the employee agrees to increase the contribution rate at each pay raise until a preset maximum level is reached. Fourth, the employee can opt out of the plan at any time. Although the hope is that employees will not opt out, the ability to do so makes them more comfortable about joining the plan. The SMT plan requires the employees to make decisions far in advance, and then the status quo bias works to their advantage because they do not take the option of opting out of the plan.

This plan was tested at a midsize manufacturing company whose savings participation rate was low. The 315 employees had an average savings rate of 4.4 percent of their earnings. They were asked to increase their contribution by 5 percent. Those employees who claimed they could not contribute the 5 percent were offered the SMT program. The program was made available to 207 employees, and 162 employees agreed to join. These employees had a low savings rate of 3.5 percent, on average. The 153 employees who did not join the SMT plan either did nothing or made a one-time increase in their savings rate. On average, the people who did not adopt the SMT plan had a savings rate of 5.3 percent. The effect of joining the plan was dramatic. After three pay raises, those who had joined the SMT plan had increased their savings rate from 3.5 to 11.6 percent. Those who did not join the SMT plan increased their savings rate from 5.3 to only 7.5 percent. The dramatic increase in the savings rate associated with the SMT plan was beneficial to those employees because they began saving more for their retirement. It was also beneficial to the managers of the firm because the company was being constrained by the antidiscrimination rules of the U.S. Department of Labor. Those rules restrict the proportion of retirement contributions that can be made by the higher-income employees when the lower-paid employees have low contribution rates.

The challenge for people in the financial industry is to develop more programs in which people's own psychological biases help them make good decisions instead of bad ones.

Save and Win Another such program has tried to help lower-income households to save more. Low-income families in the United States play lotteries and they believe that they are more likely to become rich from lotteries than from saving. Thus, to encourage more savers and savings, consider a savings product that has a lottery prize drawing. These lottery-linked deposit accounts use each savings deposit (or bond purchased) as a "buy-in" to win lottery prizes selected frequently. The excitement of gambling draws people to start saving. The savers earn a slightly lower interest rate than they could obtain elsewhere. The difference between what they could obtain and what they get is used for the lottery prizes periodically awarded. This structure appeals to loss-averse investors. They have the safety of the savings account and the excitement of the

potential to win a lottery.²²

These programs have existed for centuries internationally. The longest running program may be the Premium Bond in Britain, started in 1956. The bonds require a £100 minimum purchase and make the purchaser eligible for monthly prize drawings. The excitement of gambling is maintained as more than 1 million prizes are given at each drawing, from two £1 million prizes to more than a million £50 prizes. Over £30 billion of savings are held in Premium Bonds by one-quarter of British households. Programs in Central and South America give away cars and equivalent prizes daily with larger lotteries drawn monthly. The Million-a-Month-Account program was started by First National Bank in South Africa in 2005.

Recently, a program called “Save to Win” was started by the D2D Fund in Michigan and implemented through several credit unions. Each \$25 deposit into a savings account gives a chance to win (up to ten chances) monthly cash prizes (cash, gift cards, laptops, etc.) and cumulates for chances to win the annual \$100,000 grand prize. Time will tell how successful this program will be in promoting saving. A sum of \$90 billion is spent gambling in the United States each year. If only a small fraction of that is done through lottery-linked savings accounts, those individuals would be much better off!

Social Influence As [Chapter 9](#) illustrated, the social environment can have a strong influence on investment decisions. The use of peer pressure as a commitment device to reach a goal is common in society. Whether it is a formal weight-loss group or an informal study group, knowledge of what peers are doing nudge a person into action. Two interesting international studies, a randomized field study and a natural experiment, show how peers impact savings behavior.

A group of low-income entrepreneurs in Chile were given the opportunity to increase savings. The participants were randomly assigned to three subgroups.²³ The first is the control group that was offered the basic savings account. The second is the peer group, who could publicly announce their savings goals. They were also offered the basic savings account. However, their progress toward the goals was recognized in weekly meetings. Lastly, one-third of the participants

were offered a high interest rate savings account. This rate was 5 percent real interest rate, which was much higher than the 0.3 percent rate in the basic savings account of the first group. The participants in the peer group made 3.7 times more deposits than the control group and nearly twice the savings balance. Interestingly, the high interest rate group had a similar savings pattern as the control group. Higher interest rates did not drive higher savings, whereas peer pressure did improve savings. The social effects appear to have a much stronger influence than the investment characteristics of the savings plan. But social effects have two aspects: a peer pressure aspect and an aspirational aspect of seeing the success of your social group members. To disentangle these two aspects, a second experiment was conducted using messages, instead of face-to-face meetings, to inform participants of the group's progress toward savings goals. In this experiment, some people received informational messages about the saving of others in the group—the aspirational effect. Some participants were assigned a Savings Buddy. The two buddy-participants received updates about each other—the peer pressure effect. Interestingly, the two groups had similar savings patterns. So, both peer pressure and aspirational effects are effective.

The second study exploits a national pension system reform in Israel.²⁴ Prior to the change, employees had to contribute to an investment fund chosen by the employer. After the reform, employees could contribute to any of over 200 prominent funds. Who changed investment funds and why? First, going from a single fund to over 200 can overwhelm many people. In addition, the status quo bias will lead to many people not changing their investment choice. Indeed, 93 percent of the people did not switch funds. What motivated the other 7 percent to switch? Interestingly, the funds people switched to were generally not standouts in investment characteristics like low management fees, performance, or other services. The analysis suggests that peer effects had the strongest impact. The study finds an association between the new fund selected and the choices of the other employees in the department. There is an even stronger association between the fund selected and the choices of the co-workers in the same ethnic group. In other words, the investment choices of the people a particular employee is most likely to socialize with had a greater impact on the decision than the investment characteristics of the funds. A follow-up survey of the employees

confirms this. It reports that their knowledge of the fund's rate of return they chose was poor. Most of the people mentioned the recommendation of coworkers as a key source of influence.

► Summary

People face a lifelong struggle between decisions that make life more enjoyable today and ones that improve life in the future. Saving and education are good examples. Self-control helps us to focus on the long term in order to tip the balance toward the future. Self-control is also needed to reduce our susceptibility to psychological biases. The first step is to understand the biases. Then control the investment processes by knowing why you are investing, have specific investment criteria, and be sure to diversify. Lastly, control your environment. Unbiased financial advisors can help, but few investors seem to value the advice.

Institutions, financial firms, and governments are starting to learn how to frame decisions in such a way that people's psychological biases help them, instead of hurt them. We can create investment processes that improve savings (like Save to Win) and retirement plan investing (like Save More Tomorrow).

► Questions

1. How can rules of thumb be used to avoid making psychological bias-induced errors? Give examples.
2. What biases might be overcome by having quantitative criteria?
3. What biases might be overcome by reviewing one's stocks and portfolio infrequently?
4. What does libertarian paternalism refer to?

► Notes

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Physiology of Investing

This book has illustrated how investment behavior is shaped by cognitive errors, psychology, and social factors. But, does biology also play a role? A new and expanding literature shows that it does. Are we fated to make decisions through a genetically driven set of preferences endowed at birth? Yes and no. One study, described in a later section, performs a clever examination of investor allocations to the stock market in tens of thousands of identical and fraternal twins. It concludes that genetic factors explain roughly one-third of various investor choices.

For a long time, scholars have examined how biological processes factor into individual and social behavior. But only recently have physiology and investment decisions been studied. For example, men and women appear to have different levels of risk aversion and risk-taking behavior. Is this due to women having different life experiences than men, or different physiology? This question has led to investigations of investing and hormones, such as testosterone. In addition, the way in which the brain functions may affect decisions. Now that the human genome has been mapped and genetic testing costs have declined, we can examine how specific genes influence financial risk aversion and behavior. Unfortunately, the functioning of the brain degrades as we enter our elderly years, called cognitive aging, and is also a biological outcome. This chapter reviews the influence of gender, genetics, hormones, and cognitive aging on investment behavior.

► Gender

Women are under-represented in some high-paying occupations, like finance. For example, women make up less than 10 percent of the open-end mutual funds managers and less than 19 percent of the Chartered Financial Analyst (CFA) members worldwide.¹ Is this due to culture, early life experiences, or some innate differences between men and women in characteristics like risk attitudes? While that is too big of a topic for this chapter, we will explore gender differences in risk and investment attitudes.

There has been much research done investigating the differences in risk taking between men and women over many contexts. The early studies focused on socially risky behavior, like smoking, having unprotected sex, and aggressive driving. Other studies have examined the willingness to take physical risks, like climbing a steep hill or riding a donkey. One study conducted a meta-analysis of 150 previous experiments and investigations on these social risks.² The scholars concluded the women are more risk averse than men in social risk taking. That is, men are more likely to engage in these riskier activities. Does this gender-based risk aversion apply to financial risks?

An extensive number of studies have investigated financial risk aversion using experimental methods, surveys, and analysis of real portfolios. Professors Rachel Croson and Uri Gneezy summarize the findings.³ There is a set of papers that shows which sets of different gambles people choose. In these lotteries, men take more risks than women. These results are supported with studies that investigate the investment portfolios of men and women. For pension plan asset allocations, single women are less risk prone than single men. For federal government workers in the Thrift Savings Plan, women invest their pension assets more conservatively than men, and a large percentage of women choose the lowest risk portfolio available. Married women invest a smaller proportion of their portfolio in stocks than married men. In summary, the scholars concluded that women are

more risk averse than men in lab settings and in investment decisions in their lives. The results of the many studies are relatively consistent in this conclusion. It appears that one ramification of being more financially risk averse is that women take less risk in their investment portfolios. Given the basic finance theory that risk and expected return are positively related, a lower-risk portfolio will earn a lower return over long periods of time and result in a smaller portfolio value. Thus, a gender risk gap will lead to a gender wealth gap over time.

Women are biologically different from men, thus, they may make different risk choices. However, it is possible that this is a learned behavior. The differences in risk aversion may be due to conforming to the pressures of gender stereotypes that impact girls' and boys' upbringing and social interaction. One interesting study tests the risk attitudes of girls who go to all-female schools, girls who go to coed schools, and boys going to coed and single-sex schools.⁴ The purpose of the tests was to see if social interaction between boys and girls changes the way they view financial risk. The average age of the 260 students studied was just under 15. The students had a chance to accept £5 or take a coin flip in which heads yielded an £11 payment and tails yielded a £2 payment. Accepting the uncertain coin flip was riskier, but had a higher expected value of £6.5 than the certain payment of £5. They found the level of risk aversion is highest for girls at coed schools, followed by girls at same-sex schools, boys at coed schools, and boys at same-sex schools. The scholars concluded that less social interaction with boys results in girls taking more financial risk. Indeed, it appears that the lack of socialization with boys closes half of the risk aversion gender gap. Thus, some of the risk aversion gender differences may be gender-stereotype learned behavior by women instead of biology.

Those findings suggest that observed gender risk tolerance differences found in previous studies might reflect social learning rather than inherent gender traits. And of course, we are talking about a distribution of risk tolerances within the male and female populations. There are women who have lower risk aversion than most other women and even most other men. These are the women that are more likely to enter the finance profession. In other words, these women may self-select into careers that suit their attitudes. Scholars have recently examined the conjecture that women who might pursue careers in finance are constrained

by the cultural tension between time demands of the finance profession and traditional roles of women in family and society.⁵ In this scenario, the women who choose finance would be less tradition-oriented and more achievement-oriented than the general population of women. They examined this theory by surveying the CFA membership about their achievement orientation and alignment with traditional gender roles. They used the same questions as the World Values Survey to compare their sample results with the general population. Analyzing over 5,000 survey responses, they found that female CFAs are less tradition-oriented than women in the general population. They are also less tradition-oriented than male CFAs. Also, female CFAs are more achievement-oriented than both women in the general population and male CFAs. Male CFAs have about the same achievement orientation as their male counterparts in the general population. Thus, from the general population, it is the women with lower tradition and higher achievement orientations that self-select finance as a career. However, we do not yet know whether these women have different value attitudes than other women because of their genetic make-up or because of how they were raised—nature versus nurture.

► Nature Versus Nurture

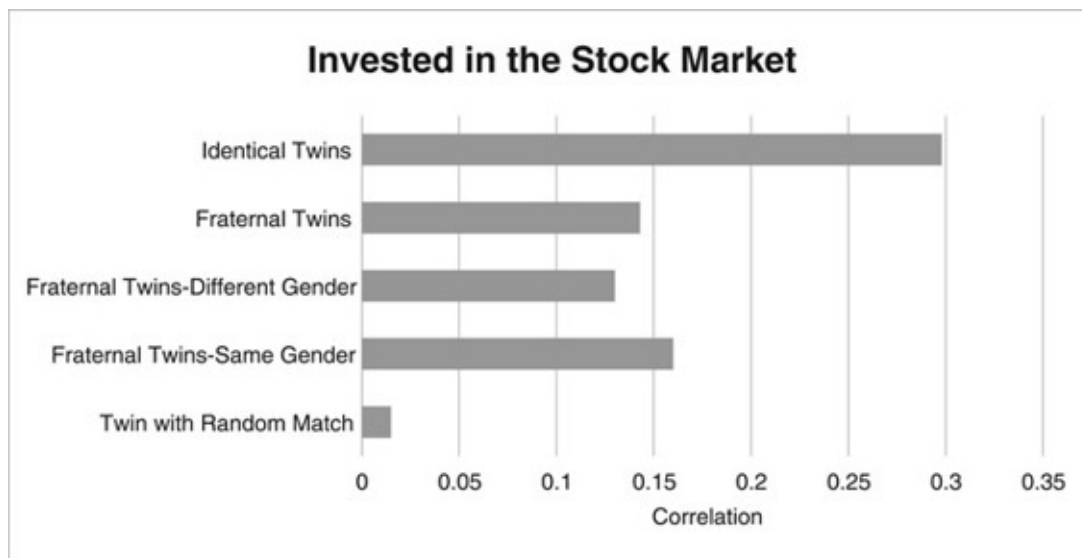
Scholars have been studying the basic sources of various types of behavior. Is our behavior driven by our genetics (nature) or is it learned from our past experiences (nurture)? Or both? There are many interesting methods for investigating this question. This section explores the actual investment behavior of twins, adoptees, siblings, and parents. These groups share different variations of shared genetics, shared rearing experiences, and unique experiences. Through clever research methods, scholars can tease out estimates of the underlying source of investment decisions.

Twins There are many interesting studies involving twins and their decisions, health, social activities, values, etc. This line of research exploits the fact that identical twins (monozygotic twins) come from one egg and one sperm. Therefore, these twins share 100 percent of their genetic material. On the other hand, fraternal twins (dizygotic twins) come from two eggs and two sperm. Therefore, they share 50 percent of their genetic material, on average. Both types of twins, if reared together, will have the same shared nurturing experience. They will have different experiences in adulthood. Through these differences in genetics, early experiences, and later experiences, scholars can tease out what portion of these three categories explain various financial and economic decisions.

The most common data source for this type of research is the Swedish Twin Registry, which has identification for twins born in Sweden since 1886. Depending on the timeframe to be studied, the registry can identify tens of thousands of identical and fraternal twins. Over the years, the twins have taken telephone surveys, mail surveys, and Internet surveys. Thus, there is a battery of information available about them. In addition, Swedish scholars can merge this data with national databases like those maintained by the Swedish Tax Agency, Premium Pension Agency, and the military, among others. Using these databases,

surveys, and even lab experiments, several scholars have investigated the proportion of influence genetics have on financial economics.

A good place to begin is with the research that uses the investment assets held by the twins to proxy for their decisions. Prior to 2006, Sweden had a 1.5 percent annual tax on wealth. Therefore, each citizen reported assets owned, along with income, to the Tax Agency. Combining this data on investments held and twin status, a team of scholars studied the financial portfolio of over 37,000 twins and an equal sample of non-twins.⁶ They examined three investment choices: (1) whether they invested in the stock market, (2) the portion of their portfolio invested in the stock market, and (3) the level of risk in the portfolio as measured by volatility. How similar were the decisions for different types of twins? [Figure 12.1](#) shows the correlation between twins for the portion of the portfolio invested in the stock market.



[Figure 12.1](#) Decision Correlation Between Groups of Twins

Note that if decisions are driven by shared early experiences, then the correlation between identical twins should be the same as between fraternal twins. However, the correlation between identical twins is more than twice that of fraternal twins. This means that this investment decision is much more similar between identical twins than for fraternal twins. Early shared experiences do play a role, however. Notice that pairing a twin with a random person of the same age shows that their

decision correlation is very small. So, both shared experiences and genetics play a role in investment decision making.

Using advanced statistical techniques, these scholars could assess the degree of what explains the decisions: genetics, shared environment (early shared experiences), and unique environment. After controlling for individual characteristics, like age, income, gender, wealth, education, etc., they reported that genetics explain about a third of the decision differences seen between people. This is a larger proportion than is explained by individual control characteristics like age, gender, education, and wealth *combined!* To the disappointment of parents everywhere (including me), very little is explained by shared environment. The other two-thirds is explained by unique experiences. This means that how the children are reared has little impact on how they invest later in life, but their genes and adult experiences matter a great deal. Subsample analysis shows that genetics explains the following amounts of the decision for the portion of stocks in a portfolio:

- Overall results, 29.0 percent are explained by genetics
- Age < 30, 44.5 percent
- 30 < Age < 55, 19.2 percent
- Men, 29.1 percent
- Women, 22.4 percent
- Twins reared apart, 38.5 percent

One potential criticism of this analysis is that portfolios can be distorted over time when one asset class outperforms the others. If the portfolio isn't rebalanced, then the original investment decision may be obscured. For example, if stocks have performed better than the other asset classes, then the portion of the portfolio invested in equities will increase without an active decision to explain higher equity exposure. Therefore, these scholars studied the investment choices of the twins during a mandatory "hand-over" of investment choices in the national pension system.⁷ Prior to 2000, the Swedish Premium Pension Agency made all investment choices for the individual retirement accounts. Then the government allowed each person to choose among nearly 500 investment funds for their own investment account. People could select up to five funds and

each fund was color coded to reveal its level of risk. A nationwide field experiment—how fun for scholars!

Some of the Swedes did not make an active decision on how to invest their pension money and thus were put in the default option. A large majority of 68 percent did make an active choice. As before, the authors could attribute the decisions to genetics, shared environment, and unique environment. Genetics explained 28 percent of the level of risk taken. Most of the rest was explained by unique environment experiences. As an aside, some of the funds advertised themselves as socially responsible funds. Genetics explained a whopping 60 percent of the decision to select these funds. Lastly, the scholars examined a potential psychological bias. Specifically, they identified the funds whose returns were in the top 10 percent of their category during the previous three years. People often exhibit an extrapolation bias (a form of representativeness bias). But is that related to genetics? The study shows that chasing these high-return funds can be explained by over 30 percent as genetics.

These two studies examine twin investing behavior through their investment holdings or one mandated investment decision. This is the primary kind of research done in financial economics studies. However, there are times when there is no data available for the types of investment characteristics of interest. In that case, you can just ask them (a survey) or have them participate in a measured activity (a lab experiment). These kinds of studies can augment the traditional type of research and have the advantage that the environment can be controlled much better. These next two studies utilize survey and experimental techniques.

Most applicable to this book, scholars surveyed the twins to assess their behavioral biases.⁸ The prior two studies conclude that approximately one-third of investment decisions can be attributed to genetics. Is that also true for psychological biases? The authors designed a survey to measure seven psychological biases, which was completed by 3,512 sets of twins. Specifically, they studied: (1) Representativeness Bias ([Chapter 8](#))—asked three questions about the likelihood of people belonging to different groups, (2) Sunk Cost ([Chapter 6](#))—a question about going to a show after the ticket is lost, (3) Illusion of Control

(Chapter 2)—questions about the discount acceptable to choose your own numbers in a lottery, (4) Status Quo Bias (Chapter 4)—question about having switched to cheaper service providers newly available, (5) Procrastination (Chapter 11)—question about being late paying bills, (6) Time Impatience (Chapter 5)—discount acceptable to receive money sooner, and (7) Loss Aversion (Chapter 3)—asked three lottery questions.

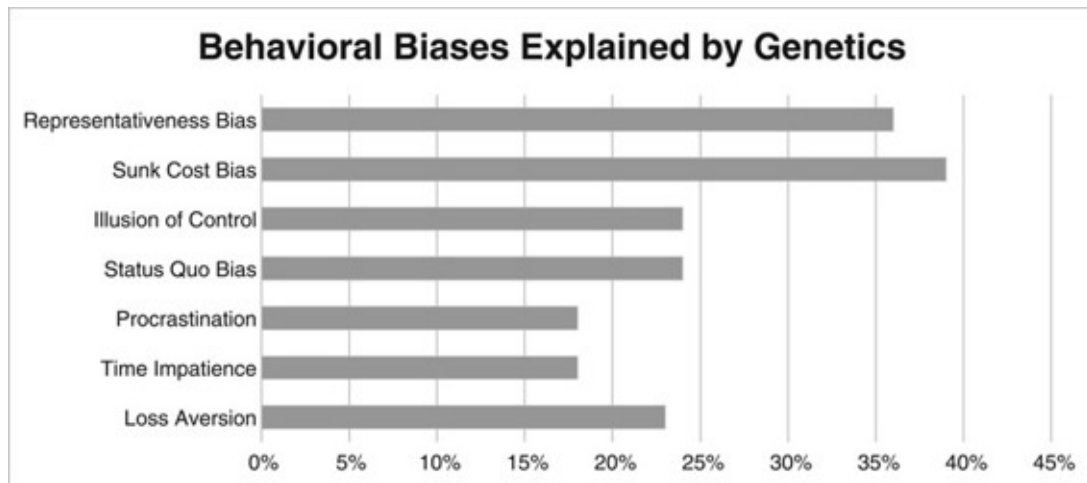
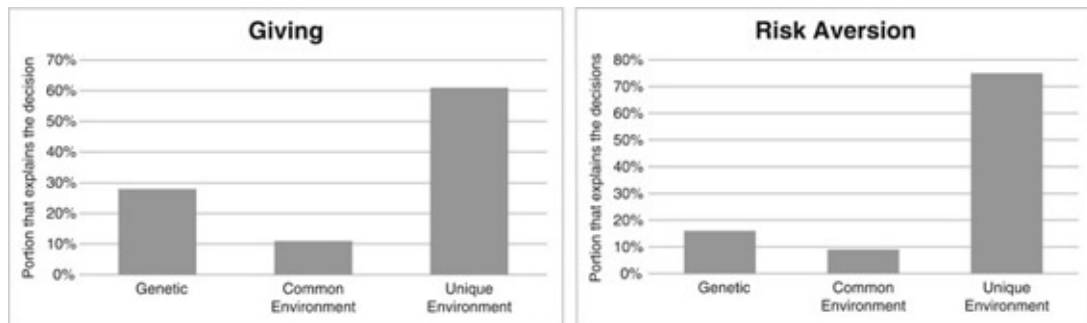


Figure 12.2 Portion of the Psychological Bias Explained by Genetics

Using the same twin methodology as before, the authors studied whether genetics play a role in psychological biases. Figure 12.2 shows the portion of the bias explained by genetics. Depending on the specific bias examined, genetics seem to explain one-fifth to one-third of whether the bias is exhibited, or to what level it is revealed. The representativeness bias and sunk cost bias seem to be highly tied to genetics, followed by the illusion of control, status quo bias, and loss aversion. Procrastination and time impatience show lower genetic influence. Again, most of the explanation for exhibiting the behavioral biases comes from the non-shared (or unique) environment and very little from the shared environment.

Finally, another study invites twins to participate in a lab experiment.⁹ This study investigates their propensity toward giving and their risk aversion through games/simulations in the lab. The study included 460 twin pairs who came to the experimental setting. To measure giving propensity, the twins participated in an exercise in which they divided \$15 into a portion they could keep and a portion donated to a charity for the homeless. To measure risk aversion, they choose

between a certain payoff and a chance selection of one of six risky alternatives. One alternative was randomly chosen and the gamble was executed, so they may have actually won money. This is an important aspect of experiments so that participants treat their responses seriously. Using the twin methodology, the authors determined the portion of the giving or risk aversion that they can attribute to genetics. [Figure 12.3](#) shows their results.



[Figure 12.3](#) Attributing the Source That Drives the Decision

Note that genetics explain nearly 30 percent of the amount donated to charity and 15 percent of their level of risk aversion. In both cases, the shared environment explains little of these behaviors. The risk aversion estimates are smaller than those from another survey study that uses the Minnesota Twin Registry,¹⁰ but the number of twins surveyed is much lower.

In summary, our genes seem to explain a large portion of the investment decisions we make and the biases we exhibit. The environment in which we are raised explains a very small portion of these decisions. In that regard, nature drives our decisions more than nurture. However, the experiences we have throughout adulthood explain the highest portion of our decisions. Thus, in the end, nurture wins out.

Adoption The studies using twins report that a substantial portion of investment behavior and risk aversion is explained by genetics. However, these studies use the same statistical methods for allocating behavior between genetics, shared environment, and unique environment. There is also some criticism that too much of the variation between identical twins and fraternal twins is attributed to genetics. Some of the difference may be driven by the fact that identical twins

seem to communicate with each other more throughout their lives than fraternal twins. Also, parents, teachers, coaches, etc. tend to hold the same standards and expectations for each identical twin, but not for each fraternal twin. Thus, it is useful to examine other tests for the role of genetics in investing. This section reviews evidence from other intergenerational studies using adoption.

Sweden also keeps extensive records about adopted children. Records identify, when possible, the adoptive and biological mother and father. Thus, combining this data with the extensive wealth data described in the previous sections allows researchers another opportunity to examine the role of genetics and stock market participation and risk aversion. One team of scholars identified 3,185 adults that had been adopted and their adoptive and biological parents.¹¹ In addition, they compared the investment similarities between the adoptee with both sets of parents to the similarities between over 2 million nonadoptees and their parents. The study examines the similarity of the adoptee's investment decisions with those decisions of the adoptive parents and the biological parents. They found that both pre-birth (genetics) and post-birth (environmental) effects are important in determining the intergenerational transmission of stock market participation and risk aversion. They estimated that the adopted parents effect (environmental) has twice the impact on the adoptee's decision to participate in the stock market than the biological parents effect (genetics). The adoptive effect is four times larger than the biological effect for the level of risk taken, as measured by the volatility of the portfolio. However, the biological effect appeared to have no influence on the portion of the portfolio invested in equities. Overall, this study of adoptions suggests that genetics does matter, but environment matters more. The estimates seem similar to the twin studies if we compare the adoptee's post-birth effects to the twins' combined shared and unique environments.

Another study exploits a sample of Korean children adopted by Norwegian parents within weeks of birth.¹² The study obtained data on 2,265 Korean-Norwegian adoptees and their adoptive parents. Scholars have access to records on peoples' wealth, income, and investment assets in Norway, similar to that of Sweden. The study examined the mechanisms for intergenerational transmission of wealth and risk aversion in the absence of genetic similarities. Records of the

adoptees and their parents were utilized and made a strong case that the rearing environment has significant influence on a child's future wealth accumulation and financial risk taking. In other words, being raised by adoptive parents who take more financial risk is associated with the adoptee engaging in financial risky behavior. To reconcile this result with those of the twin studies, they examined adoptees and non-adopted siblings. The Korean-Norwegian adoptees share no genetic markers with their adoptive parents, while the non-adoptive siblings do. Using methods similar to those in the twin studies, they found the genetic, shared environment, and unique environment contributions to investment decisions, as shown in [Table 12.1](#). The study findings show that genetics has a similar role in acquiring financial wealth, explaining about one-third of the decisions, as found in the twin studies. The role of genetics is very high (over 50 percent) in educational level attained, but plays no role in the equity portion of the portfolio. The genetic role for stock market participation is nearly 14 percent. Overall, the study illustrates that a person's genes has an impact on their financial decisions.

[Table 12.1](#) Role of Genetics in Korean-Norwegian Adoptees' Investment Decisions

	Stock Market Participation	Risky Portion of Portfolio	Financial Wealth	Education
Genetics	13.7%	-3.9%	35.5%	57.7%
Shared Environment	10.3%	20.8%	12.5%	11.1%
Unique Environment	76.0%	83.1%	52.0%	31.2%

► Physiology

Some activities, such as gambling, can impact a person's physiology. Indeed, professional poker players try to get clues from their amateur opponents through assessing their heart rate, breathing, pupil size, and other physical cues. Thus, physiology could play various roles in financial decisions, like investment decisions, risk taking, and speculative trading.

Hormones The major classes of hormones include amines (such as adrenalin and noradrenalin), peptides and proteins (such as oxytocin and leptin), and steroids (such as testosterone, oestradiol, and cortisol). Testosterone is known as the male hormone, although women have testosterone in lower measures. High levels of testosterone have been shown to be associated with riskier behavior in many social contexts and decreases trust. Therefore, it is likely that testosterone levels can impact financial decision making.

Testosterone is an important hormone for both current behavior and for the body's formation in utero. Higher exposure to prenatal testosterone leaves measurable impacts on the body. Examples of these body markers are: (1) the ratio between the length of the second and fourth fingers (2D:4D) is smaller for people who were exposed to higher prenatal testosterone, and (2) more testosterone leads to higher masculinity of facial features. Thus, studies of the impact of testosterone on financial risk taking can be conducted either through association with these body markers or by medically measuring current active testosterone.

One study examines the facial masculinity of CEOs and posits that testosterone influences both face shape and corporate decisions in finance and accounting. The higher prenatal testosterone, measured as a more masculine face, the higher risks will be taken. They found that facial masculinity is positively associated with financial misre-porting, insider trading, and option backdating.¹³ Two

studies examine the association between the participant's 2D:4D finger ratio and risk aversion or trading profits. In the first, researchers surveyed 152 participants (65 female, 87 male) on three risky financial decisions using lottery questions.¹⁴ They concluded that subjects exposed to higher levels of prenatal testosterone (as indicated with a smaller 2D:4D ratio) are more willing to take financial risks. This occurred for both men and women. In the second study, researchers followed 45 high-frequency male traders from a trading floor in London.¹⁵ The findings report that both the 2D:4D ratio and the number of years of training equally predicted the trader's 20-month trading profitability. Thus, biology and experience had roughly an even contribution to trading success.

In addition to this theory of prenatal testosterone exposure impacting brain and other body development is the Twin Testosterone Transfer hypothesis. The theory postulates that for opposite-sex fraternal twins, the higher level of prenatal testosterone in the amniotic fluid from the male fetus increases the pre-birth testosterone exposure of the female fetus. This results in a masculinization of the female twin. In general, women tend to be more risk averse than men. If this transfer theory and prenatal testosterone exposure theory are correct, then the female twin of a female-male pair should take more financial risk than other women, all else equal. To test this, we return to the Swedish Twin Registry. A study examines 9,410 females from opposite-sex twin pairs and compares them to 9,093 females from same-sex twin pairs.¹⁶ Compared to females from a same-sex twin, the study concludes that female twins from an opposite-sex pair:

- allocates more of her financial assets to equity;
- invests in a higher-risk portfolio, as measured by return volatility; and
- allots a higher proportion to individual stocks relative to mutual funds.

The authors then included male twins in the analysis to estimate the gender gap in risk aversion and how it might be impacted by prenatal testosterone exposure. They found that prenatal testosterone exposure for the females from opposite-sex pairs explains:

- 38.6 percent of the gender gap in the allocation to equity; and
- 10 percent and 11 percent, respectively, of the gap in portfolio volatility and

allocation to individual stocks.

In other tests, the study finds that the females from opposite-sex twin pairs exhibit other behaviors that begin to close the gender gap. Specifically, it reports that they trade more often (overconfidence) and own more lottery-type stocks than same-sex female twins.

The other category of testosterone studies measures the level of active testosterone in participants and then examines their financial trading or decisions. Professor John Coates and his colleagues conducted several studies of testosterone and financial risk taking. In one study, they measured morning and afternoon testosterone levels in a small group (n=17) of male traders for eight consecutive business days under real working conditions.¹⁷ Testosterone can easily be measured through a sample of a person's saliva. The authors found that traders achieved a significantly greater daily profitability on days when their morning testosterone level was above their overall median level over the course of the study. These results show that morning testosterone levels can partially predict the direction of daily profitability in traders.

Another study examines the performance and salivary testosterone in subjects engaging in the Iowa Gambling Task. This task provides monetary rewards and losses over a series of rounds to test the decision-making sensitivity to rewards and losses. The researchers started each of 154 subjects with a loan of \$2,000 and instructed them to make as much money as they could over the 100 rounds.¹⁸ In each round of the Iowa Gambling Task, the subject can draw from one of four decks of cards. Each deck of cards is set up to reveal a different sequence and distribution of reward/loss outcomes. Subjects learn about the distributions from observing the outcomes of each draw. The study shows that subjects with higher testosterone levels took greater risks (drew more from higher-risk decks of cards) than lower testosterone subjects.

Vital Signs So far, the physiology of the body has been illustrated to help to predict financial risk taking. However, it is likely that the physiology-finance relationship can go in the other direction, too. That is, financial decision making can impact our body. For example, while gambling, your heart rate and blood

pressure might rise.

Researchers examined ten professional foreign-exchange and interest rate derivatives traders during a typical trading day.¹⁹ They measured physiological conditions like heart rate, blood pressure, respiration, skin temperature, skin conductance response, etc. Many of these measures assessed the emotional response of the trader. Do emotions have a place in *rational* financial decision-making processes? They may, but they definitely play a role in *normal* financial decision making, even for experienced professional traders. The scholars identified periods of high risk and uncertainty with measures of security price volatility and return volatility. They found that periods of high volatility are associated with high blood pressure, higher skin temperature, and greater skin conductance responses in the traders. Skin conductance response occurs when the sweat glands are activated. These high-risk events caused greater physiological responses in low-experience traders than in high-experience traders, but even the highly experienced traders exhibited the effect. Clearly, high-risk and uncertain events impact the body, even for professional traders. Of course, a study like this allows for a tremendous amount of physiological data, but only included a sample of ten people. How much can we generalize these results?

The market's performance may *cause* positive or negative emotions, and the associated physical symptoms, in the general investment public. One study examines this conjecture through hospital admissions in California after large stock market declines.²⁰ The scholars found a strong link between stock market crashes and hospital admissions for anxiety, panic disorder, and major depression. For example, the U.S. stock market declined nearly 25 percent on Black Monday (October 19, 1987). Hospital admissions spiked over 5 percent that day. There was no reversal effect the next day when the market regained half its losses on Tuesday. Their results are stronger when they examined only admissions for psychological conditions. It appears that the stock market can make you sick.

► Genoeconomics

The term “genoeconomics” refers to the use of molecular genetic information in economics. The Human Genome Project determined the sequence of nucleotide base pairs that make up human DNA and identified and mapped the location and functionality for all the genes of the human genome. The costs of genotyping a person have fallen to the point that large-scale explorations to associate specific genes with behavior are now possible. However, there are still great obstacles to overcome. One example is scale. The human genome has approximately 3 billion nucleotide pairs arranged into the 23 chromosomes. Luckily, all humans share 99.6 percent of their genetic variation, so we just need to identify the differences. Nevertheless, that still leaves hundreds of thousands of genetic markers to compare to financial decisions.

The scale is still very large and can be problematic. For example, one study used 363,776 types of genetic data on each of 7,574 individuals to assess what gene variants may drive educational attainment.²¹ However, because the number of genetic types far exceeds the number of people, the tests have very low power to detect true associations. Indeed, the authors replicated the same analysis on a different 9,535 people and did not find the same genetic-behavior associations. Thus, they illustrate how spurious the results of these tests can be.

An alternative method of examining genes and behavior is to focus on a small number of genetic markers that are selected because of their neurochemical function. For example, dopamine is a neurotransmitter that has been associated with the reward and pleasure system in the brain. Certain thoughts or acts trigger the dopamine release, which provides feelings of joy. Those acts become associated with the feeling of joy, and thus dopamine provides positive reinforcement for the behaviors. The dopamine receptors modulate the binding of the neurotransmitter, which regulates the intensity of the sensation. These receptor genes can have variations between people. There are specific gene codes

for the function of different dopamine receptors. One of these genes, known as DRD4, produces receptors in the limbic system, the prefrontal cortex, and the striatum areas of the brain. These regions of the brain are responsible for motivation, cognition, and emotion. Thus, variations in this DRD4 gene can impact how people are rewarded (with joy) for various thoughts and activities. If these thoughts and activities are about risk and uncertainty, it could impact a person's level of risk aversion.

The DRD4 gene has variations called alleles that differ in the number of times a segment of the gene repeats itself. The most common versions are either the 4-repeat allele, which is carried by approximately three-quarters of the population, or the 7-repeat (or more) allele. The presence of the higher-repeating alleles (7 or more) has been shown to be related to reduced sensitivity to dopamine. A reduced sensitivity to dopamine requires relatively more stimulation to provoke the same internal reward. People with at least one allele of 7-repeats or longer are more likely to engage in novelty-seeking or compulsive gambling. Thus, one study explores the difference in the level of financial risk aversion and patience between people with a low-repeat allele compared to those with a high-repeat allele.²² The DRD4 allele can be determined from mouthwash swished from cheek to cheek to obtain sloughed cheek cells.

The study included 137 participants: 51 with the 7-repeat allele DRD4 and 86 without long-repeat alleles. Using the experiment design, the participants conducted traditional risk lottery activities, and then lotteries with ambiguous probabilities, as well as risk choices framed in the loss domain. In addition, they filled out a questionnaire that asked about their real-life financial experiences and their tendency to save money, pay off credit card balances, etc.

The experiment results do not indicate that the 7-repeats were more risk seeking in the traditional lottery tasks. However, they did behave significantly less conservatively when confronting ambiguous risk and risk with losses. Specifically, they appear more loss averse. Also, they did not make fewer patient choices and thus did not appear impulsive. They did, however, appear to have a subtler bias to the present. The authors concluded that "they seek novelty in that they are more likely to incur financial risk when the situation is ambiguous or

losses are involved than when the odds are known and the outcomes are all positive.”

For the questionnaire results, there were also significant differences in the real-life financial choices between the people with and without the 7-repeat DRD4 allele. The interesting finds are that the 7-repeat people:

- hold fewer funds in savings;
- are less likely to pay off credit card balances each month;
- withdraw more cash than needed at the ATM;
- are less likely to use a debit card instead of a credit card; and
- are less likely to purchase overdraft protection.

The authors concluded that the people with the 7-repeat allele are less likely to make the safe, patient financial choice. The neurobiological difference between the groups is that 7-repeat people need more stimulation to feel the same pleasure of dopamine. Small changes in stimulation do not generate enough joy to notice. Small stimuli have little or no effect on 7-repeat people and they seek strong stimuli to feel the dopamine reward. This appears to have an impact on their financial decision making. In the future, we should expect to see many more studies on genetic markers and financial behavior.

► Cognitive Aging

People tend to become more risk averse as they get older. Is this due to biological reasons or environment? It could be biological because cognition tends to decline with age. Cognition has also been shown to be negatively correlated with risk aversion. That is, people with higher cognitive ability are willing to take more financial risk. However, it could also be environment. For example, older people have different investment needs. Earlier in their life cycle, they may have invested for capital growth over long periods of time. Later in life, they may invest for income over a shorter time horizon. Thus, differences in financial risk aversion could stem from different needs over time, different cognitive ability, or both.

This is an important question for much of the world that is experiencing an aging population. The U.S. baby boom population has been reaching retirement age for several years and this will continue for a decade. The demographics in Europe are similar to the U.S. The aging of Japan is even further along. Thus, the financial behavior of older investors has important implications for the capital markets, the investment industry, society, and government policy around the globe.

To separate the role of age and cognitive ability, one study utilizes the Survey of Health, Ageing, and Retirement in Europe (SHARE) with over 12,000 people aged 50 or older.²³ The survey includes a person's age, a question about their financial risk attitude, their stock market participation, and three areas of cognitive skills (math, verbal fluency, and memory). The study results show that after controlling for age, the index of these three cognitive skills is a strong predictor of the level of financial risk a person is willing to take and whether they are invested in the stock market. The higher the cognitive ability, the more risk the person is willing to take. Of the three measures of cognitive ability, the math score had the strongest results. The verbal fluency score also was a strong predictor of risk taking, while the memory score had only a marginal impact. The authors

concluded that 85 percent of the association between age and risk attitudes can be attributed to cognitive ability. Thus, most of the increase in financial risk aversion associated with getting older is due to cognitive aging and much less due to the change in financial needs.

Cognitive aging can have an important negative impact on a person's portfolio. However, some of the negative impact may be offset through the investment experience a person gains over time. As an investor gets older, what has a larger impact—cognitive decline or investment experience? One study examines this question through the analysis of the portfolio holdings and trades of over 62,000 investor accounts from a U.S. discount brokerage.²⁴ The researchers used the investor's age to proxy for cognitive ability and the time the brokerage account had been open to proxy for experience. By examining the age and time an account had been open in relation to investment performance, trading, diversification, etc., the authors assessed how investment skill and behavior is impacted by cognitive aging and experience.

Their evidence supports life-cycle predictions that older investors hold less risky portfolios. They also show evidence that experience leads older investors to exhibit stronger preference for diversification, trade less frequently, exhibit greater propensity for year-end tax-loss selling, and exhibit fewer behavioral biases. Consistent with cognitive aging effects, they found that older investors exhibit worse stock selection ability and poor diversification skill. As investors both age and gain experience, their investment skill increases. Then, as cognitive aging begins, that skill starts to diminish, even while gaining more experience. The investment skill deteriorates sharply starting at the age of 70. The impact of the declining cognitive ability results in an estimated 3 percent lower risk-adjusted annual returns and that underperformance increases to over 5 percent among older investors with large portfolios. Thus, there are real economic consequences to cognitive aging.

► Summary

There is a substantial difference in risk attitudes between men and women. Women exhibit more risk aversion in their portfolios and in experimental financial gamble choices. This is likely to result in lower returns over their lifetimes and thus less investment wealth than men, all else equal. However, some of the difference may be due to the learning of gender stereotypes. This suggests that both nature and nurture impact investing decisions. The research on twins and adoptees suggest that one-fifth to one-third of financial risk aversion, financial decision making, and investment biases can be attributed to one's genes. However, discovering the association between areas of the human and investment behavior is difficult because the genome is so large. However, it is easier to test specific genes whose function is known. For example, the variations in the receptors that regulate our sensitivity to our reward mechanisms, dopamine, do appear to be associated with novelty or risk taking.

How the body functions also impacts financial decision making. For example, hormones play an important role. The more testosterone present in utero, or actively present in the body, the higher the tolerance for risk. But financial outcomes also affect a person's body. Large market declines have been shown to be associated with increases in hospital admissions, especially those for psychological conditions. Lastly, as people become older, especially after age 70, they experience cognitive aging. This reduces their investment ability and increases their risk aversion. The effect causes significant declines in investment performance. The aging of the population in many countries may find their capital markets impacted by large portions of wealth being controlled by the elderly.

► Questions

1. What are the differences in investment behavior between men and women? Is this difference driven by biology or by social norms? Explain.
2. Given the results of twin and adoptee studies, what portion of investment attitudes can be attributed to genetic factors, childhood experiences, and adult experiences?
3. How does the presence of testosterone affect a person's risk attitudes? Explain the impact of current and prenatal exposure of testosterone to investing.
4. How does investing and its outcomes affect the body?
5. Describe the impact of cognitive aging on a person, their investment decisions, and society.

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