Beyond Greed and Fear

Understanding Behavioral Finance and the Psychology of Investing

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PART I

WHAT IS BEHAVIORAL FINANCE?

Chapter 1

Introduction

Wall $treet Week with Louis Rukeyser panelist Frank Cappiello once explained that because of a "change in psychology," but "no change in fundamentals," he altered his stance on the market from positive to neutral.[1] Cappiello has plenty of company. The popular financial press regularly quotes experts and gurus on market psychology. But what do these experts and gurus mean? The stock answer is, "greed and fear." Well, is that it? Is that all there is to market psychology?

Hardly. Our knowledge of market psychology now extends well beyond greed and fear. Over the last twenty-five years, psychologists have discovered two important facts. First, the primary emotions that determine risk-taking behavior are not greed and fear, but *hope* and fear, as psychologist Lola Lopes pointed out in 1987. Second, although to err is indeed human, financial practitioners of all types, from portfolio managers to corporate executives, make the same mistakes repeatedly. The cause of these errors is documented in an important collection edited by psychologists Daniel Kahneman, Paul Slovic, and the late Amos Tversky that was published in 1982.

Behavioral finance is the application of psychology to financial behavior—the behavior of practitioners. I have written this book about practitioners, for practitioners. Practitioners need to know that because of human nature, they make particular types of mistakes. Mistakes can be very costly. By reading this book, practitioners will learn to

- recognize their own mistakes and those of others;
- understand the reasons for mistakes; and
- avoid mistakes.

For many reasons, practitioners need to recognize others' mistakes as well as their own. For example, financial advisers will be more

effective at helping investors if they have a better grasp of investor psychology. There are deeper issues too. One investor's mistakes can become another investor's profits. But one investor's mistakes can also become another investor's risk! Thus, an investor ignores the mistakes of others at his or her own peril.

Who are practitioners? The term covers a wide range of people: portfolio managers, financial planners and advisers, investors, brokers, strategists, financial analysts, investment bankers, traders, and corporate executives. They all share the same psychological traits.

The Three Themes of Behavioral Finance

The proponents of behavioral finance, myself included, argue that a few psychological phenomena pervade the entire landscape of finance. To bring this point out clearly, I have organized these phenomena around three themes. What are the three themes? And how does behavioral finance treat them differently than traditional finance does?[2] The answers are arranged by theme. I begin the discussion of each theme with a defining question.

1. Do financial practitioners commit errors because they rely on rules of thumb? Behavioral finance answers yes, and traditional finance answers no. Behavioral finance recognizes that practitioners use rules of thumb called heuristics to process data. One example of a rule of thumb is: "Past performance is the best predictor of future performance, so invest in a mutual fund having the best five-year record." Now, rules of thumb are like back-of-the-envelope calculations—they are generally imperfect. Therefore, practitioners hold biased beliefs that predispose them to commit errors. For this reason, I assign the label heuristic-driven bias to the first behavioral theme. In contrast, traditional finance assumes that when processing data, practitioners use statistical tools appropriately and correctly.
2. Does form as well as substance influence practitioners? By form, I mean the description or *frame* of a decision problem. Behavioral finance postulates that in addition to objective considerations, practitioners' perceptions of risk and return are highly influenced by how decision problems are framed. For this reason, I assign the label *frame dependence* to the second behavioral theme. In contrast, traditional finance assumes *frame independence*, meaning that practitioners view all decisions through the transparent, objective lens of risk and return.

3. Do errors and decision frames affect the prices established in the market? Behavioral finance assumes that heuristic-driven bias and framing effects cause market prices to deviate from fundamental values. I assign the label *inefficient markets* to the third theme. In contrast, traditional finance assumes that markets are efficient. Efficiency means that the price of each security coincides with fundamental value, even if some practitioners suffer from heuristic-driven bias or frame dependence.[3]

Just How Pervasive Are Behavioral Phenomena?

Behavioral phenomena play an important role in the major areas of finance: portfolio theory, asset pricing, corporate finance, and the pricing of options. These areas correspond to works recognized for Nobel prizes in economics, for the development of financial economics. To date, two such Nobel prizes have been awarded, to five recipients, for their contributions in finance.

In 1990 Harry Markowitz, Merton Miller, and William Sharpe shared the first prize. The Nobel committee recognized Markowitz for having developed portfolio theory, Miller for laying the basis for the theory of corporate finance, and Sharpe for developing the capital asset pricing model. In 1997, the committee recognized Myron Scholes and Robert Merton for having developed option pricing theory. I have drawn on recent comments by all five Nobel laureates in order to make the connection between their work and the insights from behavioral finance.

Why Is Behavioral Finance Important for Practitioners?

Practitioners are prone to committing specific errors. Some are minor, and some are fatal. Behavioral finance can help practitioners recognize their own errors as well as the errors of others. Practitioners need to understand that both are important. Here is a game, called the "pick-a-number game" designed to bring out the point.

In April 1997 the *Financial Times* ran a contest suggested by economist Richard Thaler.[4] The paper announced that the contest winner would receive two British Airways round-trip "Club Class" tickets between London and either New York or Chicago. Readers were told to choose a whole number between 0 and 100. The winning entry would be the one closest to two-thirds of the average entry.

The *Financial Times* provided the following short example to help readers understand the contest: Suppose five people enter the contest and they choose 10, 20, 30, 40 and 50. In this case, the average is 30, two-thirds of which is 20. The person who chose to enter 20 would be the winner.

What is the point of this pick-a-number game? The point is that if you are playing to win, you need to understand how the other players are thinking. Suppose you think everyone who enters the contest will choose 20, since that is the winning choice in the example. In that case, you should choose the integer closest to two-thirds of 20, or 14.

But you might reflect on this for a moment, and wonder whether most other entrants would also be thinking along these lines, and therefore all be planning to choose 14. In that case, your best choice would be 10. And if you kept rethinking your choice, you would eventually come down to choosing 1.[5] And if everyone thinks along these lines, the winning entry will indeed be 1.

But in a group of normal, even well-educated, people, the winning entry will not be 1. In the *Financial Times* contest, with two transatlantic round-trip tickets at stake, the winning choice was 13.[6] If everyone chose a 1, then nobody would have made a mistake in his or her choice. But if 13 is the winning choice, then most people are making mistakes. The real point of this game is that playing sensibly requires you to have a sense of the magnitude of the other players' errors.

The pick-a-number game illustrates two of the three themes of behavioral finance. People commit errors in the course of making decisions; and these errors cause the prices of securities to be different from what they would have been in an error-free environment.

Paul Gompers and Andrew Metrick (1998) document that between 1980 and 1996, there was a marked increase in institutional ownership and concentration of equities. This shift magnifies the possible market impact of mistakes made by a small group of people. As the next example illustrates, practitioners ignore the moral from the pick-a-number game at their peril.

Consider the case of Long Term Capital Management (LTCM), a hedge fund that received considerable publicity during the second half of 1998. Three of the partners in LTCM are extremely well known—John Meriwether, who pioneered fixed-income arbitrage at Salomon Brothers, and Nobel laureates Myron Scholes and Robert Merton, mentioned earlier.[7] LTCM had generated spectacular after-fee returns between 1994 and 1997.[8] At year-end 1997, LTCM held more than $7 billion of capital.

But 1998 turned out to be disastrous, as LTCM watched its $7 billion shrink to $4 billion. In September of that year, the Federal Reserve Bank of New York felt the need to organize a privately funded rescue plan in which fourteen major banks and brokerage houses contributed a total of $3.6 billion in exchange for 90 percent of LTCM's equity. Clearly, something had gone terribly wrong.

In fact, many things had gone wrong, but the following example is particularly illuminating. LTCM had taken large positions in two companies, Royal Dutch Petroleum and Shell Transport and Trading, that jointly owned the entity Royal Dutch/Shell. The shares of Royal Dutch Petroleum trade on the London Stock Exchange, while those of Shell Transport trade on the New York Stock Exchange. In a recent case study, Kenneth Froot and Andre Perolt (1996) point out that a corporate charter linking these two companies divides the joint cash flow of Royal Dutch/Shell between them on a 60/40 basis. Presumably, this should lock the ratio at which the shares of the two companies trade. In theory, the market value of Royal Dutch should be 1.5 times as large as the market value of Shell Transport. But as with the pick-a-number game, actual prices typically depart from what they would be in an error-free environment.[9]

Interestingly, the shares of Shell Transport have traditionally traded not at parity but at an 18 percent discount relative to Royal Dutch. When the discount widened beyond 18 percent, LTCM did a "pairs" trade. They took a long position in Shell Transport and a corresponding short position in Royal Dutch, anticipating a short-term profit when the discount reverted to its traditional value. But LTCM encountered the same fate as someone who chose a 1 in the pick-a-number game. It wasn't a winning strategy. As *Business Week* reported in its November 9, 1998, issue (Spiro with Laderman), the discount widened rather than narrowed.

We are not done with Long-Term Capital Management. As we shall see in later chapters, the experiences of that particular hedge fund offer many illustrations of behavioral phenomena.

How Behavioral Finance Developed

Behavioral finance burgeoned when the advances made by psychologists came to the attention of economists. As noted, many of the behavioral concepts described in this volume can be found in Kahneman, Slovic, and Tversky's 1982 volume. These authors' works play a central role in the field of behavioral finance.

Slovic's work emphasizes misperceptions about risk. Early on, he saw the relevance of behavioral concepts for finance and discussed it in two articles. The first, pertaining to stockbrokers, appeared in the 1969 *Journal of Applied Psychology*. The other, pertaining to individual investors, was published in the 1972 *Journal of Finance*.

Amos Tversky and Daniel Kahneman published two articles that had a profound impact on finance. Their 1974 article in *Science* (Tversky and Kahneman) deals with heuristic-driven errors, while their 1979 article in *Econometrica* (Kahneman and Tversky) deals with frame dependence.

These last two articles strongly influenced both my work with Richard Thaler on self-control and savings behavior, and my work with Meir Statman on the "dividend puzzle." The article addressing the dividend puzzle, so dubbed by the late Fischer Black, was published by the *Journal of Financial Economics* in 1984. Because he saw the limitations of the traditional approach to finance, Black enthusiastically supported the development of behavioral finance. As president-elect of the American Finance Association, he chose to include a session on behavioral finance that I was fortunate to chair at the 1984 annual meeting.

In July 1985, the *Journal of Finance* published two of the papers presented at that session. One paper, by Werner De Bondt and Richard Thaler, applied Tversky and Kahneman's notion of representativeness to market pricing. De Bondt and Thaler argued that investors overreact to both bad news and good news. Therefore, overreaction leads past losers to become underpriced and past winners to become overpriced. The second paper, by Meir Statman and me, applied Kahneman and Tversky's notion of framing to the realization of losses. We called this phenomenon the *disposition effect*, arguing that investors are predisposed to holding losers too long and selling winners too early. These two papers defined two different avenues for looking at the implications of behavioral phenomena, with one stream focusing on security prices and the other on the behavior of investors.

In effect, the behavioral perspective brought an organized body of knowledge to bear on an approach to trading that had already been practiced for some time. De Bondt and Thaler's work is in the tradition of Benjamin Graham and David Dodd's notion of value investing, first described in their classic 1934 work, *Security Analysis*. In the late 1970s, money manager David Dreman became well known for advocating the price-to-earnings ratio (P/E) as a value measure.

In the 1980s, scholars began to discover a host of empirical results that were not consistent with the view that market returns were determined in accordance with the capital asset pricing model (CAPM) and

efficient market theory. Proponents of traditional finance regarded these findings as anomalous, and thus called them *anomalies*. The anomalies started with size—e.g., the small-firm effect—and kept on coming. Soon we had the January effect, the weekend effect, and the holiday effect. As they discovered new anomalies, scholars began to wonder whether traditional finance was incapable of explaining what determines security prices.

The Reaction from Traditional Finance

Behavioral finance and traditional finance differ sharply in respect to the three themes. So how have the proponents of traditional finance reacted? Consider first the reaction to the concept of frame dependence. In 1985, a year after the appearance of my article with Meir Statman on the dividend puzzle, the University of Chicago sponsored a conference to discuss behavioral finance.

Nobel laureates Merton Miller and Franco Modigliani developed the traditional theory of dividends. At the Chicago conference, Miller discussed the Shefrin-Statman approach. He acknowledged that our approach might apply to his own Aunt Minnie—an interesting story perhaps, but one of many interesting stories. In fact, Miller argued, the stories were too interesting: they were distracting and diverted the attention of scholars away from the identifying the fundamental forces that drive markets. He repeated this point in the published proceedings of the conference (Miller 1986).

One of the chapters in this book deals with the behavioral biases that led to the Orange County bankruptcy—the largest municipal bankruptcy in U.S. history—and to subsequent lawsuits that involved Merrill Lynch and many others. Merrill Lynch retained Miller's services to assist them with their defense. In a 1997 article, Miller and coauthor David Ross argued that the bankruptcy was entirely avoidable. They may well be right. But the bankruptcy did happen—largely, I would argue, because of a series of behavioral biases. And this leads me to suggest that these biases are not too distracting, at least if our purpose is to understand major events in financial markets.

Indeed, as I hope to make clear in this book through the use of numerous stories, behavioral phenomena are both ubiquitous and germane: ubiquitous because you will find them wherever people are making financial decisions; germane because heuristic-driven bias and framing effects are very expensive.

In a 1987 survey of the literature on market efficiency, Robert Merton (1987b) began by reviewing a classic 1965 article by Paul

Samuelson. He then moved on to discuss the challenges presented by Robert Shiller's (1981) work on stock market volatility, the De Bondt–Thaler overreaction effect, and the Shefrin-Statman treatment of loss realization.[10] At that time, Merton wrote that the evidence against market efficiency was "premature." He pointed to technical difficulties with Shiller's framework, weak statistical effects in the De Bondt-Thaler study, and an apparent contradiction between the prescriptions of De Bondt-Thaler and those of Shefrin-Statman.[11]

Robert Merton may well have been right that in 1987 it was premature to reject market efficiency. Since 1987, however, scholars have done much work studying phenomena that involve volatility, overreaction, and loss realization, and they have resolved some of the issues Merton raised. For example, in a 1998 article Terrance Odean (1998a) confirms the Shefrin-Statman claims about realizing losers; and Odean's study of investment performance finds no contradiction with the De Bondt–Thaler effect.[12] Certainly, the experience of Long-Term Capital Management, where Merton has been extensively involved, suggests a move away from the firm conviction that markets are efficient. However, I hasten to add that rejecting market efficiency is not the same thing as having absorbed all the lessons of behavioral finance.

Still, some tenaciously cling to the belief that markets are efficient. Eugene Fama (1998b), who pioneered work on the efficient market hypothesis, has written a more recent survey of the challenges to market efficiency presented by behavioral finance. In 1998, he published a portion of his survey in a University of Chicago Graduate School of Business magazine. The title summarizes his view: "Efficiency Survives the Attack of the Anomalies" (Fama 1998a). In this connection, I have heard Fama describe behavioral finance as nothing more than "anomalies dredging."

Fama's remark about "anomalies dredging" raises two issues. The first, narrower issue, addressed in chapters 7 and 8, is whether markets are efficient. With respect to Fama's specific concerns about market inefficiency and behavioral finance, I suggest that the weight of the evidence favors the behavioral point of view. The second, broader issue is whether there is more to behavioral finance than just market inefficiency. In other words, would heuristic-driven bias and frame dependence be irrelevant if markets were efficient? This issue will be discussed throughout the book, with the caveat that neither practitioners nor scholars can afford to ignore heuristic-driven bias and frame dependence. The mistakes are too expensive.

Stories and Quotations

Merton Miller and I agree that there are many interesting stories in finance. We disagree about what to do with them. Miller argues that we should ignore stories because they draw attention away from fundamental forces. I argue that we should embrace stories because they provide insight into the psychological forces that impact financial decisions and prices.

In this book, I describe a small number of behavioral concepts and a large number of behavioral stories. The power of behavioral finance is such that a few key concepts underlie many different stories. These stories span a lot of territory and illustrate how heuristic-driven bias and frame dependence affect the following:

- Wall Street strategists as they predict the market
- security analysts as they recommend stocks
- portfolio managers as they pick stocks
- hedge fund managers as they trade currencies
- investment bankers as they take companies public
- individual investors as they save for retirement
- financial planners as they advise investors
- corporate executives as they take over other companies

Stories are illustrative—aids to help readers gain insight into behavioral finance. Note that I do not base general claims on stories. Rather, it is the other way around. The literature on behavioral finance contains studies documenting general phenomena; I have selected stories to illustrate the general findings.

I quote extensively in the stories, mostly from the popular press. Quotations offer important insights into the thought processes of practitioners, and therefore into the underlying psychology. What people say provides a window into how they think, and how they think lies at the heart of behavioral finance.

Plan of the Book

I have organized the book around themes and applications. The rest of part I—chapters 2, 3, and 4—presents the three themes that underlie behavioral finance: heuristic-driven bias, frame dependence, and inefficient prices, respectively.

I have organized the remainder of the book around specific applications. I devote part II to applications that feature predictions about the overall market, stock returns, and earnings. Most of these applications concern different forms of heuristic-driven bias and the effect of these errors on market efficiency.

Part III presents applications that involve individual investors, such as selling at a loss, portfolio selection, and retirement saving. These applications deal mostly with frame dependence and heuristic-driven bias.

The applications discussed in the remainder of the book involve all three themes. In part IV I focus on the relationship among the money management industry and the investors they serve. This part deals with institutional investors: open-ended mutual funds, closed-end mutual funds, the management of fixed income securities, and the tax-exempt money management industry.

In part V I look at corporate executives and their relationships with analysts and investors. I discuss these relationships in several contexts: corporate takeovers, initial public offerings, seasoned equity offerings, and analysts' earnings forecasts and stock recommendations. Part VI is devoted to special topics in investment: options, futures, and foreign exchange.

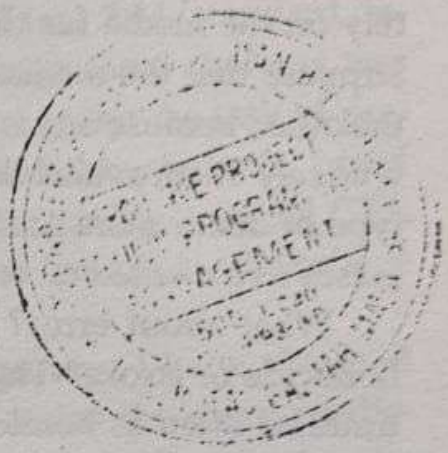
Parts II through VI follow a particular format. Each chapter begins with a short case that illustrates the main message of that chapter. Then, in the remainder of the chapter, I present the general findings from the behavioral finance literature, as typified by the case. The upside of this technique is that it makes the application of behavioral concepts to finance very easy to see. The downside of the technique is *hindsight bias*, a behavioral error. Someone susceptible to hindsight bias views events, after the fact, as being almost inevitable. In presenting these cases, by no means do I wish to suggest that they needed to turn out the way they did. Rather, they happened to do so.

What's Next?

I have arranged the topics in a particular order. Readers will thus find some advantage in reading the chapters consecutively; however, this should not deter those who want to follow a different order. I say this with one caveat. Since the next three chapters focus on main themes of behavioral finance—heuristic-driven bias, frame dependence, and inefficient markets—which constitute the core concepts in the book, I strongly suggest that readers complete these chapters before moving on to the applications. With that, let's take up the first theme.

Chapter 2

Heuristic-Driven Bias: The First Theme



This chapter discusses the following:

- availability bias
- representativeness, grade point average, winners, and losers
- regression to the mean and stock market prediction
- gambler's fallacy and stock market prediction
- overconfidence and expert judgment
- anchoring-and-adjustment and earnings forecasts
- aversion to ambiguity

The dictionary definition for the word *heuristic* refers to the process by which people find things out for themselves, usually by trial and error. Trial and error often leads people to develop rules of thumb, but this process often leads to other errors. One of the great advances of behavioral psychology is the identification of the principles underlying these rules of thumb and the systematic errors associated with them. In turn, these rules of thumb have themselves come to be called *heuristics*.

An Illustrative Example

Consider this question: Which is the more frequent cause of death in the United States, homicide or stroke? How do most people go about answering this question? The majority rely on recall, that is, by seeing how many events of each type come readily to mind. If people more readily recall instances of homicide than of stroke, then they will

answer "homicide." This simple rule conforms to the principle known as *availability*—the degree to which information is readily available. A rule based on this principle is called an *availability heuristic*.

Heuristics are like back-of-the-envelope calculations that sometimes come close to providing the right answer. But heuristics may involve *bias*, meaning they may tend to be off target in a particular direction, and this can apply to an availability heuristic also. Most people rely on the media for their information about homicides and strokes. Suppose that the media tends to report one cause of death more than the other, because one is newsworthy and the other is not. Then people who rely on an availability heuristic may recall instances related to one type of death more readily than the other. Therefore, media coverage biases a rule based on recall.

What about error? Which is the more frequent cause of death, homicide or stroke? The answer is stroke. In fact, strokes occur *eleven* times as often as homicides (Slovic, Fischoff, and Lichtenstein 1979). People who rely on an availability heuristic tend to be amazed by this fact.

Let's look at these steps from a broader perspective:

- People develop general principles as they find things out for themselves;
- They rely on heuristics, rules of thumb, to draw inferences from the information at their disposal;
- People are susceptible to particular errors because the heuristics they use are imperfect; and
- People actually commit errors in particular situations.

Taken together, these four statements define *heuristic-driven bias*.[1]

Representativeness

One of the most important principles affecting financial decisions is known as *representativeness*. Representativeness refers to judgments based on stereotypes. The principle of representativeness was proposed by psychologists Daniel Kahneman and Amos Tversky (1972), and analyzed in a series of papers reproduced in the collection edited by Kahneman, Slovic, and Tversky (1982).

Consider an example involving admissions officers in universities. One measure of successful admission decisions is that students who

are admitted perform well scholastically. Therefore, imagine a situation where an admissions officer is attempting to predict the grade point average (GPA) of some prospective students based upon their high school GPA levels.

Here are some actual data for undergraduates at Santa Clara University, based on students who entered the university in the years 1990, 1991, and 1992.[2] During this period, the mean high school GPA of students who entered as freshmen and graduated was 3.44 (standard deviation was 0.36). The mean college GPA of those same students was 3.08 (standard deviation 0.40). Suppose you are given the task of predicting the graduating GPA for three undergraduate students, based solely on their high school GPA scores. The three high school GPA scores are 2.20, 3.00, and 3.80. What are your predictions for the college GPAs of these students upon graduation?

In administering this question to large groups, I have obtained very consistent mean responses. Table 2-1 contains the mean predictions along with the actual results. The average predictions for the question are 2.03, 2.77, and 3.46, whereas the actual results are 2.70, 2.93, and 3.30, respectively. Notice that at both the low end and the high end, the predictions are too far from the mean of 3.08. That is, both the low (2.20) and high (3.80) high school GPAs result in college GPAs that are much closer to the mean than the predictions. These responses illustrate that people do not appreciate the extent to which there is *regression to the mean*.

Representativeness is about reliance on stereotypes. The simplest example based on this principle is to predict that college GPA will be the same as high school GPA. Now most people do not use as simple a rule as this one. But they do base their predictions on how *representative* a student appears to be. Thus a student with a high GPA in high school

Table 2-1
Actual GPAs are closer to the mean than predicted GPAs.

High School GPA	Predicted College GPA	Actual College GPA
2.20	2.03	2.70
3.00	2.77	2.93
3.80	3.46	3.30

is seen as representative of a good student. Notice that they are especially hard on students with low high school GPAs. What most people fail to appreciate is that students with the lowest high school GPAs may have experienced bad luck, and consequently will, on average, do better in college.[3] So, the heuristic involves bias; representativeness can be misleading. Again, people fail to recognize regression to the mean. Therefore, they are predisposed to making errors when they predict the future GPA of particular individuals.

A financial example illustrating representativeness is the winner-loser effect documented by Werner De Bondt and Richard Thaler (1985, 1987). De Bondt and Thaler find that stocks that have been extreme past losers in the preceding three years do much better than extreme past winners over the subsequent three years. De Bondt (1992) shows that the long-term earnings forecasts made by security analysts tend to be biased in the direction of recent success. Specifically, analysts overreact in that they are much more optimistic about recent winners than they are about recent losers.

Do you recognize any similarities with the GPA question above? De Bondt and Thaler base their argument on the misapplication of representativeness. In effect, I suggest that investors treat past losers like high school students with low GPAs, and past winners as high school students with high GPAs. Notice that the predictions are particularly pessimistic when it comes to the low GPA students. People tend to predict that a student with a low high school GPA will end up with an even lower college GPA, indicative of a "kick 'em when they're down" perspective.[4] As we shall see in chapter 4, the same phenomenon also appears to be at work when it comes to stocks. The returns to past losers are exceptionally high, suggesting that investors become unduly pessimistic about the prospects of these stocks.

Before leaving representativeness, let us consider one more example showing that although financial professionals may recognize regression to the mean, they may not apply it properly. Below is an excerpt from an interview that appeared in the August 18, 1997 issue of *Fortune* magazine, with global strategist Barton Biggs of Morgan Stanley and senior investment adviser Robert Farrell of Merrill Lynch (Armour, 1997). This interview occurred after two-and-one-half years of spectacular stock market returns. I have divided the excerpt into two parts. The first part sets the stage for a discussion about regression to the mean, and also for an issue that comes up in chapter 5 (on skewed confidence intervals). Here is the first part of the excerpt:

Biggs: My view is that we're at the very tag end of a super bull market. That means the prudent person who's thinking ahead toward retirement should assume that over the next five to ten years the total return from his equity portfolio is going to be in the 5%- to 6%-a-year range.

Fortune: NOT THE 15% TO 20% WE'VE COME TO LOVE AND EXPECT?

Biggs: Right. It's very late in the game.

Farrell: Trouble is, it's looked that way for a long time.

Biggs: Yes, but it's never looked as much that way as it does right now.

We will come back to the "late-in-the-game issue" a little later. For now, consider regression to the mean.

Farrell: It's been better to have been a novice than a professional the past few years, because people with the most experience have been the most cautious. But markets do regress back to the mean (return to their long-term average performance), and I agree we are late in the ball game. This is the longest period we've ever had with such high returns from equities, and I can't believe it's a new era that will just keep going forever. I don't know if returns going forward will be 7% or 8%, but I'm pretty sure they will be below average.

This interview raises a number of very important issues. Look first at the last three sentences in Robert Farrell's remarks, where he predicts below-average returns. What's his rationale? Well, he says markets "regress back to the mean" and points out that this "is the longest period we've ever had with such high returns."

Is a prediction of below-average returns appropriate? Take another look at table 2-1, the GPA example. Would we predict that the student with the 3.80 high school GPA would end up with a college GPA *below* the mean of 3.08? I don't think so. Regression to the mean suggests that future returns will be closer to their historical average. But it doesn't say they will be *below* their historical average.[5]

Farrell's error, too low a prediction, stems from *gambler's fallacy*. If five tosses of a fair coin all turn out to be heads, what is the probability that the sixth toss will be tails? If the coin is fair, the correct answer is one-half. Yet many people have a mental picture that when a fair coin is tossed a few times in a row, the resulting pattern will feature about the same number of heads as tails. In other words, the representative

pattern features about the same number of heads and tails. So, after a run of five heads, people tend to predict tails on the sixth toss, because of the representativeness heuristic. From their perspective, "a tail is due." But this reasoning is wrong, just as below-average returns are no more likely after "the longest period we've ever had with such high returns."

Gambler's fallacy arises because people misinterpret the law of averages, technically known as the "law of large numbers." They think the law of large numbers applies to small samples as well as to large samples. This led Tversky and Kahneman (1971) to facetiously describe gambler's fallacy as the "law of small numbers."

Let's go back to Farrell's remarks about future returns. Notice that he tells us he is "pretty sure they will be below average." Time will tell if he ultimately is right. I say ultimately because in the twenty-one months that followed the *Fortune* magazine interview, the S&P 500 returned more than 41 percent. But his statement that he is "pretty sure" leads us to the next issue—*overconfidence*.

Overconfidence

Here is a question for you.

> The Dow Jones Industrial Average closed 1998 at 9181. As a price index, the Dow does not include reinvested dividends. If the Dow were redefined to reflect the reinvestment of all dividends since May 1896, when it commenced at a value of 40, what would its value have been at the end of 1998? In addition to writing down your best guess, also write down a low guess and a high guess, so that you feel 90 percent confident that the true answer will lie between your low guess and your high guess.

Ready? The answer to the preceding question is found in the title of a paper by Roger Clarke and Meir Statman (1999): "The DJIA Crossed 652,230 (in 1998)." If people were well calibrated, then 90 out of every 100 would find that the correct answer lay between their low and high guesses. But when I ask this question as part of a survey, virtually nobody finds that the true answer lies between his or her low and high guesses. For most, their high guesses are much too low. So most people are not well calibrated. Instead, they are overconfident.

When people are overconfident, they set overly narrow confidence bands. They set their high guess too low (and their low guess too high).

Hence, they get surprised more frequently than they anticipated. Later in this volume we will come across Wall Street strategists who, in the course of reviewing their predictions in the light of actual events, speak about being "humbled." In other words, they were overconfident in their predictions.

Anchoring-and-Adjustment, Conservatism

Next is a textbook problem in probability, designed by psychologist Ward Edwards (1964) that provides some insight into analysts' earnings revisions.

> Imagine 100 book bags, each of which contains 1,000 poker chips. Forty-five bags contain 700 black chips and 300 red chips. The other 55 bags contain 300 black chips and 700 red chips. You cannot see inside either bag. One of the bags is selected at random by means of a coin toss. Consider the following two questions about the book bag.
>
> 1. What probability would you assign to the event that the selected bag contains predominantly black chips?
> 2. Now imagine that 12 chips are drawn, with replacement, from the selected bag. These twelve draws produce 8 blacks and 4 reds. Would you use the new information about the drawing of chips to revise your probability that the selected bag contains predominantly black chips? If so, what new probability would you assign?

This problem is analogous to the tasks faced by financial analysts. The bag is like a company that in the future may operate in the black or in the red. So in accordance with generally accepted accounting colors, black chips stand for good future earnings, red for poor future earnings. Analysts start out with information that leads them to form their initial beliefs. In this case, beliefs concern the probability that the bag contains predominantly black chips. The most frequent answer given to the first of the two preceding questions is 45 percent. So, the bag of chips is like a company that appears more likely to generate poor future earnings than good future earnings.

The second question is a lot more difficult than the first. The drawing of 8 black chips and 4 red chips is akin to a positive earnings announcement. So now the question is how to react to a positive earnings announcement made by a company that has not been performing all that well.

When I administer these questions, I find that the two most frequent responses to the second question are 45 percent and 67 percent—the two most *salient* numbers in the problem—with 45 percent being the number of bags containing predominantly black chips, and 67 percent the fraction of black chips drawn with replacement.

Those who respond with 45 percent essentially do not know how to incorporate the new information. So, they stick with their initial beliefs. Since the "earnings announcement " is favorable, they *underreact.*

People who answer 67 percent (or thereabouts) focus on the fact that two thirds of the chips drawn with replacement are black. They ignore their prior information, in accordance with the representativeness heuristic. Do they overreact, underreact, or get it just right?

The correct answer to the second question is 96.04 percent. About 55 percent of those responding choose either 45 percent or 67 percent; The remaining responses are scattered. But most are well below 96 percent. In fact, most are below 75 percent. In other words, most people respond too *conservatively* to the new information in this problem. Perhaps they get anchored on to 45 percent and do not adjust sufficiently to the new information.

This is how security analysts react to earnings announcements: They do not revise their earnings estimates enough to reflect the new information. Consequently, positive earnings surprises tend to be followed by more positive earnings surprises, and negative surprises by more negative surprises. Of course, the unexpected surprises in store for analysts are also a manifestation of overconfidence because overly narrow confidence bands mean people get surprised more frequently than they anticipate.

Aversion to Ambiguity

Imagine that I offered you the choice between accepting a sure $1,000 or an even gamble in which you either win $0 or $2000. When I pose this question in MBA classes, about 40 percent of the students say they would take the gamble.

I describe this choice to students by telling them that there is a bag containing 100 poker chips, 50 black chips and 50 red chips; they can choose a sure $1,000, or a lottery ticket that pays $2,000 if a black chip is drawn at random from the bag but $0 if a red chip is drawn.

Now consider this variation. Imagine the bag contains 100 colored chips that are either red or black, but the proportions are unknown. Many people who are willing to gamble when the odds are even prefer

to play it safe and take the sure $1,000 when the odds are unknown. This phenomenon is known as the *aversion to ambiguity*. People prefer the familiar to the unfamiliar.

Remember the Wall Street proverb about greed and fear? I note that the emotional aspect of aversion to ambiguity is fear of the unknown. The case of Long-Term Capital Management, discussed in chapter 1, provides an apt example of this phenomenon. Recall that on September 23, 1998, a $3.6 billion private rescue of LTCM was arranged. The Federal Reserve Bank of New York orchestrated this plan because of a concern that the failure of LTCM might cause a collapse in the global financial system. The November 16, 1998, issue of the *Wall Street Journal* describes the scene as the participants departed the meeting at which the deal was struck. The article attributes an interesting remark to Herbert Allison, then president of Merrill Lynch, a remark that typifies aversion to ambiguity as fear of the unknown. "As they filed out, they were left to ponder whether all this was necessary, and whether a collapse would really have jolted the global financial system. 'It was a very large unknown,' Merrill's Mr. Allison says. 'It wasn't worth a jump into the abyss to find out how deep it was.'"[6]

Emotion and Cognition

The issues discussed in this chapter involve cognitive errors, that is, errors that stem from the way that people think. But in describing ambiguity to aversion in terms of fear of the unknown, I suggest that some phenomena involve a combination of cognition and emotion. Of course, both involve mental processes, and may be physiologically linked, as opposed to being separate from each other. Scholars have produced ample evidence that emotion plays an important role in the way people remember events. So, phenomena involving the availability heuristic may reflect both cognitive and emotional elements. Here is an example.

In 1972, the Dow closed at 1020. In 1982 it closed at 1047, just 27 points higher than the value achieved a decade earlier. In between, it gyrated wildly, recording four years of negative growth. During this period, inflation reduced the purchasing power of a dollar by over 66 percent. A 1995 article in the *Wall Street Journal* quotes Russell Fuller, president of RJF Asset Management (now Fuller & Thaler Asset Management) in San Mateo, California, as follows: "'People like myself, who have been in the business since before the 1973–74 crash, we

were terrified by that crash,' says Mr. Fuller, the money manager. 'That's a very low probability event. But many of the people in this business have spent the last 20 years worrying about that happening again.'"[7]

Chapter 3

Frame Dependence: The Second Theme

This chapter discusses the following:

- loss aversion, loss realization, and losing projects
- mental accounting, frame dependence, and facing risk
- hedonic editing and tolerance for risk
- self-control and dividends
- regret and pension fund allocation
- money illusion and inflation

Frame *independence* lies at the heart of the Modigliani-Miller approach to corporate finance. Merton Miller has a succinct description of frame independence. When asked to explain, in twenty-five words or less, the essence of his contributions with Franco Modigliani, he said: "If you transfer a dollar from your right pocket to your left pocket, you are no wealthier. Franco and I proved that rigorously."[1]

It is a matter of form whether a person keeps a dollar of wealth in the right pocket or in the left pocket. The form used to describe a decision problem is called its *frame*. When I speak of frame independence, I mean that form is irrelevant to behavior. Proponents of traditional finance assume that framing is *transparent*. This means that practitioners can see through all the different ways cash flows might be described. Yet many frames are not transparent but rather are *opaque*. When a person has difficulty seeing through an opaque frame, his decisions typically depend on the particular frame he uses. Consequently, a difference in form is also a difference in substance. Behavior reflects frame dependence.

Loss Aversion

In their landmark work on *prospect theory*, a descriptive framework for the way people make choices in the face of risk and uncertainty, Daniel Kahneman and Amos Tversky (1979) provide evidence of frame dependence. The starting point in their work is the role of "loss," an issue explored by Harry Markowitz (1952b). Kahneman and Tversky studied how people respond to the prospect of a loss. Here is one of their examples. Suppose you face a choice between (1) accepting a sure loss of $7,500, or (2) taking a chance where there is a 75 percent chance you will lose $10,000 and a 25 percent chance you will lose nothing. The expected loss in both choices is $7,500. Would you choose to take the guaranteed loss or take a chance? Most people opt for the latter. Why? Because they hate to lose! And the uncertain choice holds out the hope they won't have to lose. Kahneman and Tversky call this phenomenon *loss aversion*. They find that a loss has about *two and a half times* the impact of a gain of the same magnitude.[2]

It is not difficult to find real-world illustrations of loss aversion. In a manual for stockbrokers, Leroy Gross (1982) describes the difficulties investors face in coming to terms with losses.

> Many clients, however, will not sell anything at a loss. They don't want to give up the hope of making money on a particular investment, or perhaps they want to get even before they get out. The "get-evenitis" disease has probably wrought more destruction on investment portfolios than anything else. . . .
>
> Investors who accept losses can no longer prattle to their loved ones, "Honey, it's only a paper loss. Just wait. It will come back." (p. 150)

Some people learn about "get-evenitis" the hard way. Take the case of Nicholas Leeson. In 1995, Leeson became famous for having caused the collapse of his employer, 232-year-old Barings PLC. How? He lost over $1.4 billion through trading. In 1992, Leeson began to engage in rogue trading in order to hide errors made by his subordinates. Eventually, he incurred losses of his own, and "get-evenitis" set in. He asserts that he "gambled on the stock market to reverse his mistakes and save the bank."[3]

"Get-evenitis" also afflicts corporate executives' ability to terminate losing projects. For example, 3Com's popular Palm Computing products, the handheld organizers that access data with a stylus, had a predecessor—Apple Computer's more sophisticated Newton.[4] Apple

CEO John Sculley was thoroughly committed to the Newton, and made it the center of his personal vision for the computer industry. He coined the term "personal digital assistant" to describe the concept and argued that it would be a pivotal step in the convergence of three industries: computing, communications, and entertainment.[5]

Development of the Newton began in 1987, and the product was launched in 1993. But at $1000, it was much too expensive for the mass market. Moreover, because of initial failures in its handwriting recognition capability, cartoonist Gary Trudeau lampooned the Newton in his comic strip *Doonesbury*. Given the size and demographics of Gary Trudeau's readership, think about the impact the availability heuristic had on Newton's potential market.

By January 1994, it was apparent that sales were disappointing and the Newton was a losing project. But Apple did not terminate it. The company was committed to personal digital assistants. A year later, in January 1995, Apple had added enhanced features, and the year after that it came out with a backlit screen, but to no avail. In March 1997 Apple spun the Newton off into its own division, but this did little good, and six months later Apple folded the division back into its own organization. Through all this, the Newton remained a loser.

CEOs may come and go, but losing projects stay on. John Sculley "went"; he was replaced by Gil Amelio, who also came and went. In a dramatic comeback, Steve Jobs, Apple's cofounder and first CEO, replaced Amelio. Years before, Sculley had ousted Jobs. In January 1998, about ten years after its inception, CEO Jobs announced his decision to terminate the Newton project.

Concurrent Decisions

Here is another Kahneman-Tversky decision problem:

> Imagine that you face the following pair of *concurrent* decisions. First examine both sets of choices, then indicate the option you prefer for each.
>
> *First decision:* Choose
>
> *A.* a sure gain of $2,400, or
>
> *B.* a 25 percent chance to gain $10,000 and a 75 percent chance to gain nothing.
>
> *Second decision:* Choose
>
> *C.* a sure loss of $7,500, or
>
> *D.* a 75 percent chance to lose $10,000 and a 25 percent chance to lose nothing.

The way that people respond to this problem tells us a lot about their approach to making decisions. Consider your own responses. Choosing *A* in the first decision would be the risk-averse choice. Most people find a sure $2,400 difficult to pass up. Although $10,000 is a lot more than $2,400, the odds of collecting it are only one in four. Hence, the expected value of *B* is $2,500, considerably less than $10,000. In fact, $2,500 is just a tad more than the guaranteed $2,400 offered in *A*.

Did you recognize the second decision? We encountered it before, in the previous section. Did you respond the same way as before? In my own experience, about 90 percent choose *D* in the second decision problem. They want the chance to get even.

The two decision problems together constitute a concurrent "package." But most people do not to see the package. They separate the choices into *mental accounts*. And that brings us to frame dependence.

Suppose you face a choice. You can take a 75 percent chance you will lose $7,600 and a 25 percent chance you will win $2,400. Or you can take that same chance and accept an additional $100. Which choice would you make? A no-brainer, right? It should be: This decision frame is transparent.

But sometimes the frame is opaque. Consider the decision problem at the beginning of this section. When I administer this problem to my MBA students, about half choose *A* & *D: A* in the first decision problem and *D* in the second. People who choose *A* & *D* end up facing a 25 percent chance of winning $2,400 and a 75 percent chance of losing $7,600. However, they could do better: They could choose the *B* & *C* combination, which would offer them a 25 percent chance of winning $2,500 and a 75 percent chance of losing $7,500. But most people don't see through the opaque frame. Therefore, they act as if they don't value $100. The opaque frame makes for a "brainer" instead of a no-brainer.

Hedonic Editing

In his stockbroker manual, Gross (1982) implicitly raises the issue of frame dependence within the context of realizing a loss. His essential point is that investors prefer some frames to others, a principle known as *hedonic editing*. Consider Gross's advice to stockbrokers:

> When you suggest that the client close at a loss a transaction that you originally recommended and invest the proceeds in another position you are currently recommending, *a real act of faith has to take place*. That

act of faith can more easily be effected if you make use of some transitional words that I call "magic selling words."

The words that I consider to have magical power in the sense that they make for a more easy acceptance of the loss are these: "Transfer your assets." (p. 150)

Why are "transfer your assets" magic selling words? Because they induce the client to use a frame in which he or she reallocates assets from one mental account to another, rather than closing a mental account at a loss.

Thaler and Eric Johnson (1991) propose a theory of hedonic editing for mental accounts. As part of a study, they administered a series of choice problems to subjects. You will find two of these problems below. Read the first problem, record your answer, and then move on to the next problem.

1. Imagine that you face the following choice. You can accept a guaranteed $1,500 or play a stylized lottery. The outcome of the stylized lottery is determined by the toss of a fair coin. If heads comes up, you win $1,950. If tails comes up, you win $1,050. Would you choose to participate in the lottery? Yes or no? Yes means you take your chances with the coin toss. No means you accept the guaranteed $1,500.[6]
2. Imagine that you face the following choice. You can accept a guaranteed loss of $750 or play a stylized lottery. The outcome of the stylized lottery is determined by the toss of a fair coin. If heads comes up, you lose $525. If tails comes up, you lose $975. Would you accept the guaranteed loss? Yes or no? Yes means you accept a $750 loss. No means you take your chance with the coin toss.

Let's consider how people usually respond to these questions. In the first choice problem, the majority prefer to take the guaranteed $1,500 over the gamble where they might get less. This could be viewed as a typical risk-averse response, because the average payoff to the lottery ticket is $1,500, the same amount involved in the riskless option. However in the second choice problem, many people choose the lottery over the guaranteed loss. This is decidedly a risk-seeking response, in that the expected payoff to the coin toss is a $750 loss, the same amount involved in the riskless option.

There is a lesson here: People are not uniform in their tolerance for risk. It depends on the situation. Some appear to tolerate risk more readily when they face the prospect of a loss than when they do not.

It is common for financial planners and investment advisers to administer risk tolerance quizzes in order to determine a degree of risk that is suitable for their clients. However behavioral finance stresses that tolerance for risk is not uni-dimensional. Rather it depends on several factors, one being recent experience facing risk. Here are two more examples developed by Thaler and Johnson that bring out the complexity of these issues.

3. Imagine that you have just won $1,500 in one stylized lottery, and have the opportunity to participate in a second stylized lottery. The outcome of the second lottery is determined by the toss of a fair coin. If heads comes up, you win $450 in the second lottery. If tails comes up, you lose $450. Would you choose to participate in the second lottery after having won the first? Yes or no?
4. Imagine that you have just lost $750 in one stylized lottery, but have the opportunity to participate in a second stylized lottery. The outcome of the second lottery is determined by the toss of a fair coin. If heads comes up, you win $225 in the second lottery. If tails comes up, you lose $225. Would you choose to participate in the second lottery after having lost in the first? Yes or no?

Now that you have recorded your yes or no answers, compare your response to choice 3 with your response to choice 1. From a dollar perspective, choices 1 and 3 are equivalent. In the framework of standard finance, people should respond the same to both. Yet in practice, many "switch" their choices. When replicating the Thaler-Johnson study I have found that about 25 percent of the respondents are more willing to take the gamble in choice problem 3 than they are in the dollar-equivalent choice problem 1. Why?

Thaler and Johnson suggest that the answer involves hedonic editing, the way people organize their mental accounts. In choice problem 3, if people lose $450 they combine it with the $1,500 gain and experience the net position of $1,050—exactly the situation they are presented with in choice problem 1. But if they win, they do not net their two gains; instead, they savor them separately. According to Thaler and Johnson, the added attraction of experiencing gains separately inclines people to be more willing to gamble.

Thaler and Johnson found that in choice problem 2, over 75 percent chose to gamble rather than accept a sure $750 loss.[7] However, although example 4 is dollar-equivalent to choice problem 2, almost 50 percent switch their choice from taking a gamble in example 2 to playing it safe in choice problem 4. Thaler and Johnson suggest an

explanation based on the way people experience losses. They note that people seem incapable of netting out moderately sized losses of similar magnitudes. So, a loss of $225 coming on top of a prior loss of $750 is especially painful. The added pain leads people to shy away from taking the gamble as framed in choice problem 4, relative to the frame in choice problem 2.

Cognitive and Emotional Aspects

People who exhibit frame dependence do so for both cognitive and emotional reasons. The cognitive aspects concern the way people organize their information, while the emotional aspects deal with the way people *feel* as they register the information.

The distinction between cognitive and emotional aspects is important. For example, the main cognitive issue in choice problem 3 is whether people ignore having just won $1,500 when deciding whether or not to take an even chance on winning or losing $450. Some do ignore the $1,500, whereas others see themselves as being $1,500 ahead. The cognitive and emotional aspects operate together, in that those who ignore the $1,500 *feel* a $450 loss as just that, a $450 loss. But those who begin by seeing themselves as $1,500 ahead instead experience a $450 loss as a smaller gain of $1,050. This difference affects behavior: Because of loss aversion, people who ignore having just won $1,500 are much less prone to accepting the gamble than those who see themselves as $1,500 ahead. Thaler and Johnson call this a "house money" effect.[8]

The term *frame dependence* means that the way people behave depends on the way that their decision problems are framed. Hedonic editing means they prefer some frames to others. That is the main insight to be gleaned from studying how people chose in the four preceding choices. In a financial context, hedonic editing offers some insight into investors' preference for cash dividends. When stock prices go up, dividends can be savored separately from capital gains. When stock prices go down, dividends serve as a "silver lining" to buffer a capital loss. Remember Merton Miller's succinct description of frame independence? Some investors prefer to keep dividends in their right pocket.

The following excerpt, taken from a *Forbes* magazine interview with closed-end fund manager Marty Zweig, describes how he came to realize the importance of dividends. It began with the fact that his fund was trading at a deep discount relative to net asset value (NAV), the value the shares would trade for if the fund were open-ended instead of being closed.

> Then in 1986 we did a closed-end fund. . . . I always worried about discounts on closed-end funds. . . . The first nine months out of the gate, we were at a 17 percent discount. I was mortified. I sat down and did a lot of thinking. Bond funds at the time were selling at about parity. Stock funds were all at discounts. It didn't make sense, because stocks do better than bonds in the long run. And I realized bond funds pay interest. People like the certainty of an income stream. So I said, "Well, we're going to pay the dividend, whether we earn it or not." And we went to this 10 percent dividend policy. . . . The discount narrowed immediately. (Brimelow, 1998)

Self-Control

Self-control means controlling emotions. Some investors value dividends for self-control reasons as well as for reasons that stem from hedonic editing.

Marty Zweig talks about paying a dividend whether earned or not because people "like the certainty of an income stream." What does a reliable dividend have to do with self-control? Meir Statman and I (Shefrin and Statman 1984) argue that the answer involves the "don't dip into capital" heuristic. Older investors, especially retirees who finance their living expenditures from their portfolios, worry about spending their wealth too quickly, thereby outliving their assets. They fear a loss of self-control, where the urge for immediate gratification leads them to go on a spending binge. Therefore, they put rules into place to guard against the temptation to overspend.

"Don't dip into capital" is akin to "don't kill the goose that lays the golden eggs." But if you don't dip into capital, how do you finance consumer expenditures—Social Security and pension checks alone? Not necessarily—this is where dividends come in. Dividends are labeled as income, not capital. And investors tend to frame dividends as income, not capital. Again, this is frame dependence. Investors feel quite comfortable choosing a portfolio of stocks that feature high dividend payouts and spending those dividends.

Regret

Imagine someone who makes a decision that turned out badly and engages in self-recrimination for not having done the right thing. *Regret* is the emotion experienced for not having made the right decision. Regret is more than the pain of loss. It is the pain associated with feeling responsible for the loss.

For example, imagine someone who has a regular route to work. One day, for the sake of variety, she decides to try a different route. That particular day she winds up in an accident. Now, even if the odds of an accident were no different on the two routes, how will that person feel? Will she chastise herself, thinking "If only I had done what I always do and taken my regular route!" If so, she is experiencing the frustration of regret.

Regret can affect the decisions people make. Someone who feels regret intensely, does not have a strong preference for variety, and thinks ahead, may follow the same route to work every day, in order to minimize possible future regret.

Here is a financial example. Consider the choice of equity-fixed income allocation in a defined contribution retirement plan. In the January 1998 issue of *Money* magazine, Harry Markowitz explains what motivated his personal choice about allocation. As the Nobel laureate recognized for having developed modern portfolio theory, was he seeking the optimum trade-off of risk and return? Not exactly. He said, "My intention was to minimize my future regret. So I split my contributions fifty-fifty between bonds and equities" (Zweig 1998, 118). In other words, had Harry Markowitz selected a 100 percent equity allocation, and had stocks subsequently done terribly, it would have been to easy, in hindsight, to imagine having selected a more conservative posture—and this would give rise to considerable self-recrimination, meaning regret.

Regret minimization also leads some investors to use dividends, instead of selling stock, to finance consumer expenditures. Those who sell stock to finance a purchase, only to find that shortly thereafter the stock price soars, are liable to feel considerable regret. That is often at the heart of expressions such as "this is my half-million-dollar car."

Money Illusion

Frame dependence also impacts the way that people deal with inflation, both cognitively and emotionally. This is the issue of *money illusion*. Let us examine the following questions from a study by Eldan Shafir, Peter Diamond, and Amos Tversky (1997).

> Consider two individuals, Ann and Barbara, who graduated from the same college a year apart. Upon graduation, both took similar jobs with publishing firms. Ann started with a yearly salary of $30,000. During her first year on the job, there was no inflation, and in her second year, Ann received a 2 percent ($600) raise in salary. Barbara also

started with a yearly salary of $30,000. During her first year on the job, there was 4 percent inflation, and in her second year, Barbara received a 5 percent ($1500) raise in salary.

a. As they entered their second year on the job, who was doing better in economic terms, Ann or Barbara?

b. As they entered their second year on the job, who do you think was happier, Ann or Barbara?

c. As they entered their second year on the job, each received a job offer from another firm. Who do you think was more likely to leave her present position for another job, Ann or Barbara?

Most people indicate that Ann is better off, Barbara is happier, and Ann is more likely to look for another job. Now this is somewhat perplexing. If Ann is better off, why is she less happy and more likely to look for another position? Shafir, Diamond, and Tversky suggest that although people can figure out how to adjust for inflation, it is not a natural way for them to think. The natural way is to think in terms of nominal values. Therefore people's emotional reaction is driven by the nominal values, and those appear more favorable for Barbara than they do for Ann.

Summary

This chapter presents the second theme of behavioral finance, frame dependence, which deals with the distinction between form and substance. Framing is about form. In short, frame dependence holds that differences in form may also be substantive. It reflects a mix of cognitive and emotional elements. The cognitive issues pertain to the way that information is mentally organized, especially the coding of outcomes into gains and losses. There are several emotional issues, the most fundamental of which is that people tend to feel losses much more acutely than they feel gains of comparable magnitude. This phenomenon has come to be known as loss aversion. Therefore, people prefer frames that obscure losses, if possible—and engage in hedonic editing. People tend to experience losses even more acutely when they feel responsible for the decision that led to the loss; this sense of responsibility leads to regret. Regret is an emotion. People who have difficulty controlling their emotions are said to lack self-control. Some people use framing effects constructively to help themselves deal with self-control difficulties.

Chapter 4

Inefficient Markets: The Third Theme

This chapter discusses the following:

- representativeness, and the market's treatment of past winners and losers
- anchoring-and-adjustment, and the market's reaction to earnings announcements
- loss aversion, and the risk premium on stocks
- sentiment, and market volatility
- overconfidence, and the attempt to exploit mispricing

Cause and Effect

One of the most fiercely debated questions in finance is whether the market is efficient or inefficient. Remember the hedge fund Long-Term Capital Management (LTCM)? How did it advertise itself to investors? LTCM members promoted their firm as an exploiter of pricing anomalies in global markets. In this regard, consider the following heated exchange between Myron Scholes, LTCM partner and Nobel laureate, and Andrew Chow, vice president in charge of derivatives for potential investor Conseco Capital. Chow is quoted as saying to Scholes, "I don't think there are that many pure anomalies that can occur"; to which Scholes responded: "As long as there continue to be people like you, we'll make money."[1]

That last remark might not be the best way to win friends and influence people. But Scholes is correct about cause and effect—investors' errors are the cause of mispricing. Is the market efficient?

The fact is that from 1994 through 1997, LTCM claims to have successfully made leveraged bets—bets that exploited mispricing identified by the option pricing theory for which Scholes and Merton jointly received the Nobel prize. In this regard Merton Miller, another Nobel laureate, is quoted as having said, "Myron once told me they are sucking up nickels from all over the world. But because they are so leveraged, that amounts to a lot of money."[2] "Sucking up nickels" is indicative of inefficiency. Of course, then came LTCM's 1998 fiasco, but more on that later.

Effects Stemming from Representativeness

Let's begin with the De Bondt–Thaler winner-loser effect. De Bondt and Thaler (1985) argue that investors who rely on the representativeness heuristic become overly pessimistic about past losers and overly optimistic about past winners, and that this instance of heuristic-driven bias causes prices to deviate from fundamental value. Specifically, past losers come to be undervalued and past winners come to be overvalued. But mispricing is not permanent; over time the mispricing corrects itself. Then losers will outperform the general market, while winners will underperform.

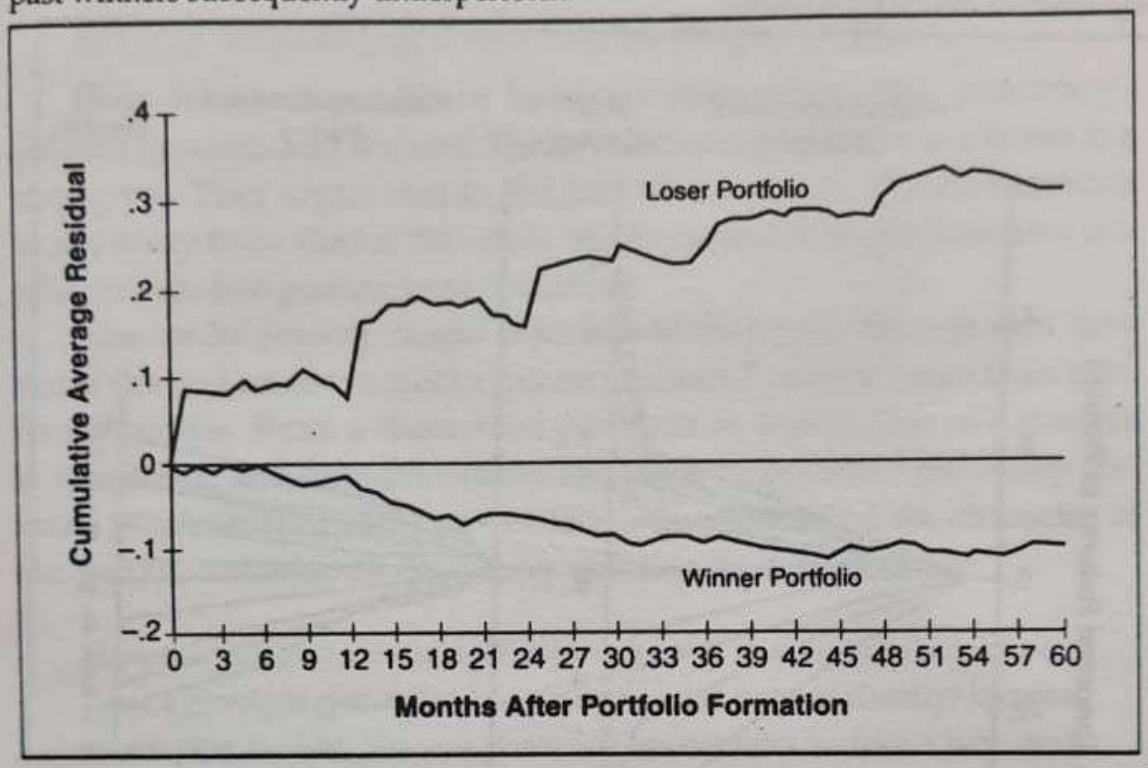
De Bondt and Thaler (1989) present evidence in support of their claim. Figure 4-1 displays the returns to two portfolios, one consisting of extreme losers and the other of extreme winners. In both cases, the criterion used to judge performance is past-three-year returns. Extreme losers are the stocks that lie in the bottom tenth percentile, while the stocks that lie in the top tenth percentile are the extreme winners.

Figure 4-1 shows cumulative returns to the two portfolios for the sixty months after formation, relative to the overall market. Notice that the cumulative returns are indeed positive for losers, about 30 percent, and negative for winners, about –10 percent. De Bondt and Thaler suggest that this pattern signifies a correction to mispricing.

In traditional finance, the pattern depicted in figure 4-1 would reflect compensation for risk. That is, losers would be associated with higher returns because they are riskier than the average stock; the opposite holds for winners. But De Bondt and Thaler contend that an investor who bought losers and sold winners short would have beaten the market by about 8 percent on a risk-adjusted basis. I discuss this issue further in chapter 7.

Figure 4-1 Cumulative Average Residuals for Winner and Loser Portfolios of 35 Stocks (1–60 months into the test period)

Cumulative abnormal returns for two portfolios, one consisting of past losers and the other consisting of past winners. Past losers subsequently outperform, while past winners subsequently underperform.



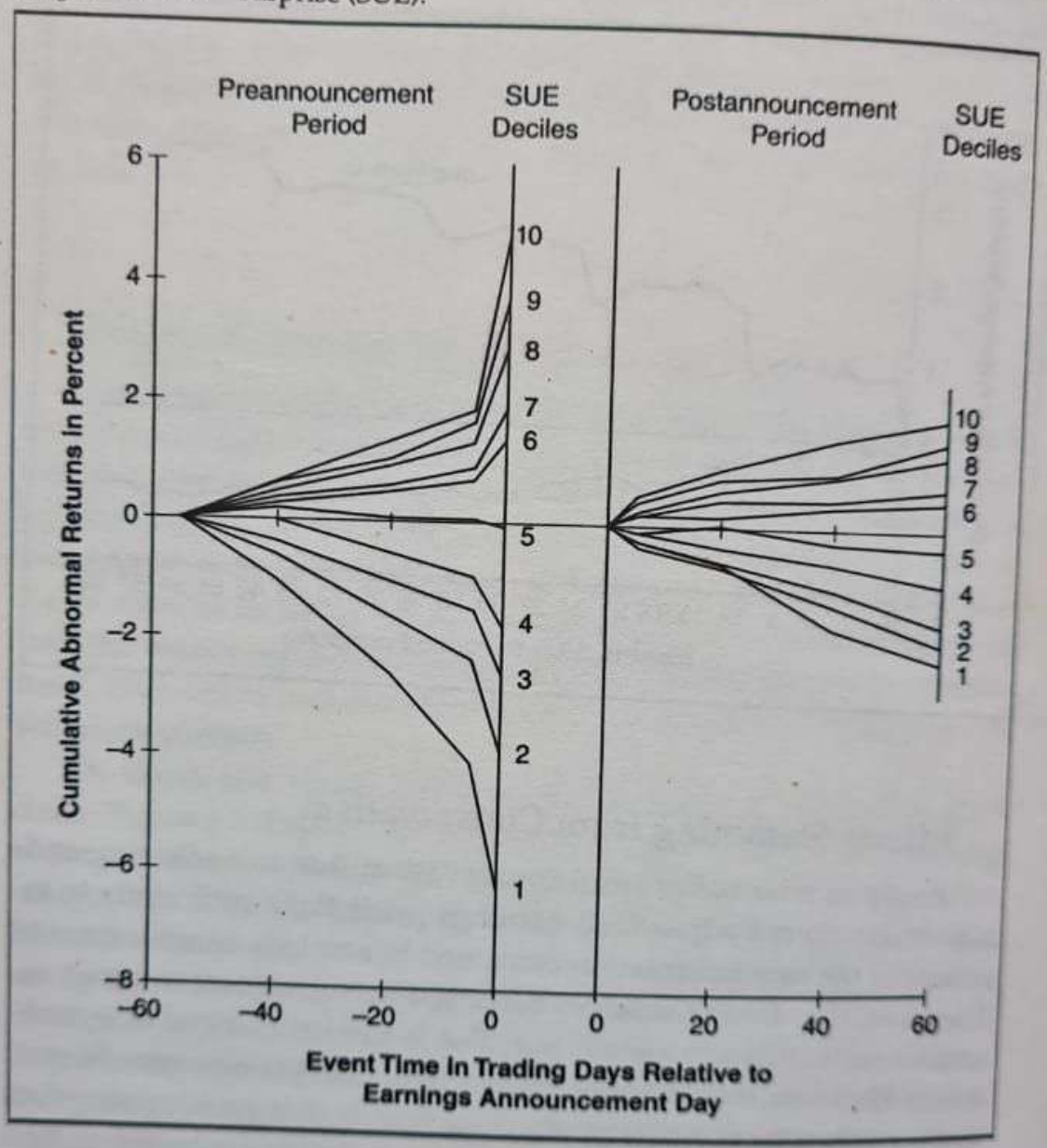
Effects Stemming from Conservatism

Analysts who suffer from conservatism due to anchoring-and-adjustment do not adjust their earnings predictions sufficiently in response to the new information contained in earnings announcements. Therefore, they find themselves surprised by subsequent earnings announcements. Unanticipated surprise is the hallmark of overconfidence. However, there is more at work here than plain overconfidence. Conservatism in earnings predictions means that positive surprises tend to be followed by positive surprises and negative surprises tend to be followed by negative surprises.

Does conservatism in analyst earnings predictions cause mispricing? If it does, then we should find that stocks associated with recent positive earnings surprises should experience higher returns than the overall market, while stocks associated with recent negative earnings surprises should earn lower returns than the overall market. Figure 4-2, taken from an article by the late Victor Bernard and Jacob Thomas (1989), summarizes the evidence.[3] The figure shows the behavior of

Figure 4-2 Cumulative Abnormal Returns (CAR) to Portfolios Based upon Standardized Unexpected Earnings (SUE)

What happens to stock prices after earnings surprises: price momentum is greater for bigger surprises. Cumulative abnormal return pattern is steeper with the magnitude of the surprise (SUE).



cumulative returns to portfolios formed based on the size of the most recent earnings surprise. In the sixty days following an earnings announcement, the stocks with the highest earnings surprises outperformed the overall market by about 2 percent, while the stocks with the most negative earnings surprises underperformed the overall market by about 2 percent.

Behavioral finance suggests that heuristic-driven errors cause mispricing. As an example, look at the pricing pattern depicted in figure 4-2. Traditional finance holds that this pricing pattern occurs because

stocks associated with positive earnings surprises are riskier than the stocks associated with negative earnings surprises. In chapter 8, I discuss why this pricing pattern cannot be explained in terms of risk.

Effects Stemming from Frame Dependence

Does frame dependence have an impact on price efficiency? Shlomo Benartzi and Richard Thaler (1995) suggest that the answer is a strong yes. They argue that in the past, loss aversion caused investors to shy away from stocks; therefore, stocks earned very large returns relative to risk-free government securities.

Economist Jeremy Siegal documents that over the last two centuries the real return to stocks has been about 7 percent more than risk-free securities. From a theoretical perspective, a premium of 7 percent is enormous, and this differential has come to be called the *equity premium puzzle* (Mehra and Prescott 1985). To understand the character of the puzzle, consider the following question on risk tolerance.

> Suppose that you are the only income earner in your family, and you have a good job guaranteed to give you your current (family) income every year for life. You are given the opportunity to take a new and equally good job, with an even chance it will double your (lifetime family) income and an even chance that it will cut your (lifetime family) income. Indicate exactly what the percentage cut x would be that would leave you indifferent between keeping your current job or taking the new job and facing a 50-50 chance of doubling your income or cutting it by x percent (Barsky et al. 1997).

When I administer this question to general audiences, the average response comes out at about 23 percent. But the kind of response necessary to justify the historical equity premium is somewhere around 4 percent. The difference between 23 percent and 4 percent is not small. In fact, being willing to tolerate no more than a 4 percent decline seems very extreme, relative to the way people normally respond to the preceding question.

Shmuel Kandel and Robert Stambaugh (1991) suggest that people might be less tolerant of risks whose magnitudes are smaller than those described in the preceding question. However, I find that when the stakes are smaller, people actually become more tolerant of risk, not less tolerant.[4]

Benartzi and Thaler (1995) suggest that individual investors' historical reluctance to hold stocks may have stemmed from their evalua-

tion horizons being too short. They call this reluctance *myopic loss aversion*. Benartzi and Thaler suggest that investors who are prone to myopic loss aversion can increase their comfort with equities by monitoring the performance of their portfolios less frequently, no more than once a year. It appears that investors who hold individual stocks monitor those stocks much more frequently than that. John Pound and Robert Shiller (1989) found that individual investors spent over a half-hour per day following the most recent stock they bought.[5] Nicholas Barberis, Ming Huang, and Tano Santos (1999) use the Thaler-Johnson "house money effect" discussed in chapter 3, to take the argument one step further. They suggest that after a market runup, the house money effect kicks in, raising investors' tolerance for risk, and lowering the equity premium. In a downturn the reverse occurs.

Departure from Fundamental Value: Short-term or Long-term?

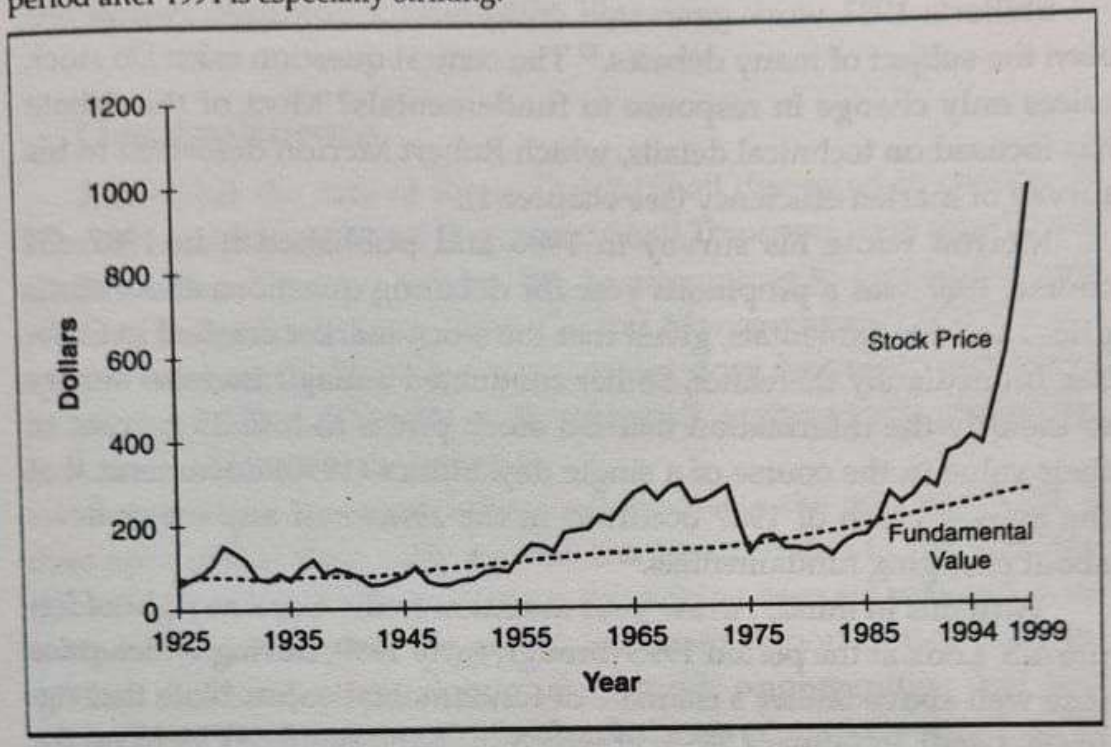
One of the most striking claims of behavioral finance is that heuristic-driven bias and frame dependence can cause prices to deviate from fundamental values for long periods. Shiller (1979, 1981) argues that there is more volatility in stock markets and bond markets than would be the case if prices were determined by fundamentals alone. His analysis vividly illustrates the length of time stock price and fundamental value can part company.

Shiller computed what the fundamental value of stocks would have been over time for an investor who had perfect foresight about the future value of dividends. He then compared fundamental value and prices.[6] Figure 4-3 depicts the timelines for two indexes, starting in 1925. The figure is scaled to adjust for the long-term historical growth rate of stock prices. One line depicts the index for fundamental value, while the other shows the index for actual stock prices.

The years 1929 and 1987 were crash years, and, as I discussed in chapter 2, 1973 was the beginning of a long bear market. Consider how these events are portrayed in figure 4-3. Prior to 1929 and 1973, price lies well above fundamental value. Shortly after those years price falls below fundamental value. The lesson here is that prices move away from fundamental value for long periods, but eventually revert.

On December 3, 1996, Shiller, along with John Campbell, expressed his views about the market in joint testimony before the Board of Governors of the Federal Reserve system (Campbell and Shiller 1998). Apparently, their testimony had some influence. Two days later, on December 5, Alan Greenspan, chairman of the Federal Reserve Board,

Figure 4-3 Fundamental Value versus Actual Price, 1925–1999
Stock prices tend to stray from fundamental value for long periods of time. The period after 1994 is especially striking.



shocked global markets when he used the term "irrational exuberance" to describe the state of the U.S. stock market.[7]

What did Shiller and Campbell tell the Federal Reserve Board? They explained that historically, when the dividend yield (D/P) has been low and the price-to-earnings ratio (P/E) high, the return to holding stocks over the subsequent ten years has tended to be low. This should not be surprising. The earnings yield is E/P, the inverse of P/E. In a rationally priced market, dividend yields and earnings yields form the basis of stock returns.[8] Recall the question in chapter 2 concerning reinvested dividends and the Dow Jones Industrial Average. One of the lessons from that question is that when it comes to long-run stock returns, compounded dividends swamp stock price.[9] The future course of earnings and dividends would have to be dramatically better than in the past to rationalize high subsequent stock returns in a low D/P and E/P environment.[10]

To place the Campbell-Shiller argument into context, let me point out that the historical mean for the dividend yield is 4.73 percent. But in late 1996, it was an extremely low 1.9 percent. The historical mean for P/E is 14.2. Moreover, for most of the time since 1872, P/E has moved in the range of 8 to 20. Until recently, its peak of 26 dated back to 1929; however, in December 1996, the P/E stood at 28. In their joint

testimony, Campbell and Shiller predicted that between 1997 and 2006, the stock market would lose about 40 percent of its real value.[11]

Shiller's 1981 work generated considerable controversy and has been the subject of many debates.[12] The central question asks: Do stock prices only change in response to fundamentals? Most of the debate has focused on technical details, which Robert Merton described in his survey of market efficiency (see chapter 1).

Merton wrote his survey in 1986 and published it in 1987. Of course, 1987 was a propitious year for debating questions about stock prices and fundamentals, given that the stock market crashed in October. Immediately thereafter, Shiller conducted a major investor survey to identify the information that led stock prices to lose 25 percent of their value in the course of a single day. Shiller (1990) documents that the market crash of 1987 occurred in the *absence* of any major news about changing fundamentals.[13]

With this in mind, I draw your attention to the extreme right of figure 4-3. Look at the period 1995 through early 1999, during which price rose well above Shiller's estimate of fundamental value. Note that figure 4-3 ends in January 1999, at which time the dividend yield on the S&P 500 had fallen further, to 1.26 percent.[14] The trailing P/E stood at a record 32.7![15]

Like Campbell and Shiller, some Wall Street strategists also placed the market's rise of 1995 and 1996 in historical context. For example, Edward Kerschner, a strategist at PaineWebber, had been bullish during the market's climb in 1995 and 1996 but then turned bearish. In a June 1997 article that appeared in *Barron's* he stated, "In '87 the market went to 135 percent of fair value, and in '73 we got to 155 percent of fair value." Kerschner went on to note that according to his P/E model, the market was 15 percent overvalued, making it the third most expensive market in a quarter of a century.[16]

In a related vein, Charles Lee, James Myers, and Bhaskaran Swaminathan (1999) have devised an intrinsic measure of the Dow Jones Industrial Average based upon the book-to-market ratio, the long-term return on equity, expected earnings growth, and interest rates. In mid-June of 1997, when Kerschner indicated that the market was 15 percent overvalued, the Lee-Myers-Swaminathan measure indicated that the Dow was 42 percent overvalued.

Kerschner has not been as steadfast in his stated view as some academic scholars have been. Strategists are subject to different pressures than scholars. During strong bull markets, bears become unpopular on Wall Street.[17] In early 1999, as the P/E of the S&P 500 hit a record

high 32, the *Wall Street Journal* reported Kerschner's view as "[S]tocks may have gotten a little ahead of themselves . . . but he thinks the fundamentals dictate future stock gains."[18]

Overconfidence

Remember the case of Royal Dutch/Shell discussed in chapter 1? The market values of Royal Dutch and Shell Transport were misaligned relative to fundamental values. Yet, in attempting to exploit the mispricing, hedge fund Long-Term Capital Management (LTCM) managed to lose heavily. There is a moral to that story. Not every instance of mispricing leads to $20 bills on the sidewalk waiting to be picked up, or even to nickels, for that matter.

In fact, there are many behavioral lessons in the saga of LTCM. It does appear that their early success can be attributed to the exploitation of mispricing. At the same time, mispricing does get reduced as investors trade to exploit the associated profit opportunities. And investors do learn, albeit slowly; thus profit opportunities that had existed in 1994 through 1996 in the derivatives markets dried up in 1997. In response, LTCM began to take other kinds of positions, such as bets on the movements of foreign currency movements. Myron Scholes is reported to have been critical of these trades, asking his LTCM colleagues questions like "What informational advantage do we have over other traders?"

Scholes asked an eminently sensible question. Here is an analogy: "How good a driver are you? Relative to the drivers you encounter on the road, are you above average, average, or below average?"

Between 65 and 80 percent of the people who answer the driver question rate themselves above average. Of course, we all want to be above average, but only half of us are! So, most people are overconfident about their driving abilities. I suspect that investors are about as overconfident of their trading abilities as they are about their driving abilities.

There are two main implications of investor overconfidence. The first is that investors take bad bets because they fail to realize that they are at an informational disadvantage. The second is that they trade more frequently than is prudent, which leads to excessive trading volume. See my work with Statman (Shefrin and Statman 1994) and Terrance Odean (1998b).

A *Wall Street Journal* article describing the experience of Long-Term Capital Management quotes Nobel laureate William Sharpe.

> "Most of academic finance is teaching that you can't earn 40 percent a year without some risk of losing a lot of money," says Mr. Sharpe, the former Stanford colleague of Mr. Scholes. "In some sense, what happened is nicely consistent with what we teach."[19]

Proponents of behavioral finance, especially those who manage money, recognize that beating the market is no snap, and they try to avoid being overconfident. Russell Fuller and Richard Thaler operate Fuller and Thaler Asset Management. They manage a mutual fund, based on the De Bondt–Thaler effect, called Behavioral Value.[20] It may sound paradoxical, but Fuller believes that markets are, in the main, efficient. He tells me that many of the De Bondt–Thaler losers are, in fact, properly priced, that "most should be losers."[21] What's the lesson? Don't think the streets are paved with gold, or at least Wall Street anyway.

One other thing: Behavioral finance offers refutable hypotheses, but it does not have all the answers. De Bondt and Thaler predicted overreaction based on representativeness. But take another look at figure 4-1. It shows that a portfolio of extreme losers does outperform the market. However, a careful inspection of the figure shows that the effect is concentrated in the month of January. I know of nothing that suggests that people rely on representativeness in some months but not others.