

# Behavioral Finance in Asset Management

## A Primer

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Financial crises are taking place more frequently and their impact is spreading across the globe—the latest examples are the 2007–2009 Great Recession and stock market crash. The need to better understand and address the root causes of such crashes becomes ever more important.

Standard finance theory cannot explain the phenomenon, but behavioral finance theory offers some compelling explanations. Behavioral finance supplements standard finance theory by introducing behavioral and psychological criteria to help clarify investors' decision-making process. This article outlines the background and key findings of behavioral finance and examines the influence of behavioral biases in stock market crashes.

### An Introduction to Behavioral Finance

In 1956, economist Vernon L. Smith<sup>1</sup> was the first to introduce the concept of behavioral finance. At the time, the investment community did not believe in the idea that human behavior influences security prices. However, others such as the psychologists Paul Slovic,<sup>2</sup> Amos Tversky,<sup>3</sup> and Daniel Kahneman,<sup>4</sup> continued to analyze investors' so-

called behavioral biases. They played a central role in the development of behavioral finance.

Slovic saw the relevance of behavioral concepts in finance and set out his thesis in two articles at the end of the 1960s (Shefrin 2002, 7–8). Then, in 1974, Tversky and Kahneman introduced the fundamental concept of heuristics—the study of how people make decisions, rush to judgment, or solve problems, often using their experiences and biases. Since then, academics and practitioners have incorporated heuristics into behavioral finance and led a vast research effort focusing on the cause and effect of psychological biases in financial markets.

More recently, in 2001, David Hirshleifer<sup>5</sup> published a concise overview of the most important behavioral biases, as shown in table 1. The biases are grouped into four categories:

- Self-deception (limits to learning)
- Heuristic Simplification
- Emotion/Affect
- Social

Key biases are highlighted in table 1. As examined below, these biases, in large part, help explain the occurrence of stock market bubbles and crashes.

### Heuristic Simplification Biases

Heuristics are experience-based techniques that help us make decisions (Kahneman et al. 1982, 3–4). Three key heuristics discussed in this article are representativeness, anchoring/salience, and loss aversion/prospect theory. Loss aversion forms part of Kahneman and Tversky's prospect theory (1979, 263–291, reviewed later in this article). In 2002, Kahneman and Smith were awarded the Nobel Memorial Prize in Economic Sciences for their work in the field of behavioral finance.

### Representativeness

Representativeness bias describes the tendency to evaluate a situation by comparing it to generalities or stereotypes. It can be thought of as a mental shortcut that helps decision makers avoid the need to analyze similar processes again and again.

In investment decision-making, representativeness bias can arise either from base-rate neglect or sample-size neglect.

**Base-rate neglect:** Investors attempt to determine the potential success of an investment in a stock by contextualizing it in a familiar, easy-to-understand classification scheme. For example, an investor might categorize a stock as a

TABLE 1: OVERVIEW OF BEHAVIORAL BIASES BY HIRSHLEIFER

Behavioral Biases			
Heuristic Simplification	Self-Deception (limits to learning)	Emotion/Affect	Social
Representativeness	Overoptimism	Ambiguity Aversion	Herding
Anchoring/Salience	Overconfidence	Self-Control (hyperbolic discounting)	Contagion
Loss Aversion/Prospect Theory	Confirmation	Mood	Imitation
Framing	Self-Attribution	Regret Theory	Cascades
Availability	Hindsight		
Cue Competition	Cognitive Dissonance		
Categorization	Conservation		

Source: Hirshleifer (2001, 1,533–1,597)

TABLE 2: TYPES OF REPRESENTATIVENESS BIASES

Type of Representativeness Bias	Examples
Base-rate neglect	<ol style="list-style-type: none"> <li>1. Investors can make significant financial errors when they examine a money manager's track record. They look at that past few quarters or years and conclude, based on inadequate statistical data, that a fund's performance is the result of skilled allocation and security selection.</li> <li>2. Investors also make similar mistakes when investigating track records of stock analysts. For example, they look at the success of an analyst's past few recommendations, erroneously assessing the analyst's aptitude based on this limited data sample.</li> </ol>
Sample-size neglect	Investors often fail to judge the likelihood of an investment outcome because they choose an inappropriate sample size of data on which to base their judgments. They incorrectly assume that small sizes are representative of real data: Researchers call this phenomenon the "law of small numbers."

Source: Pompian (2006, 66–67)

"value stock" and draw quick conclusions about the risks and rewards that follow from that categorization. This reasoning ignores variables that can impact the success of the investment. Investors often embark on this erroneous path because they perceive it as an easy alternative to the diligent and more complicated research that's actually required when evaluating an investment.

**Sample-size neglect:** Investors fail to accurately consider the sample size of the data on which they are basing their judgments and incorrectly assume that small sample sizes are representative of populations. When people do not initially comprehend a phenomenon reflected in a series of data, they quickly link assumptions based on only a few of the available data points. Individuals prone to sample-size neglect are quick to treat properties reflected in such small samples as properties that accurately describe universal pools of data. However, the small sample examined may not be representative of the real data. This is also known as the "law of small numbers."

As illustrated by the examples in table 2, both types of representativeness bias can lead to significant investment mistakes.

### Anchoring/Salience

Anchoring is the tendency of decision makers to use "anchor" values or beliefs as the basis for an assessment. When asked to form an assessment, they establish a judgment based on inappropriate

or irrelevant experience. Shiller (2005, 148) defines two types of anchors: quantitative and moral.

**Quantitative anchors** are numbers or quantitative variables used to make estimations. One obvious example is past stock prices.

**Moral anchors** play an important role when people compare the intuitive force of stories and reasons to hold their investments against their perceived need to consume the wealth that the investments represent.

While heuristics can aid in decision making, they sometimes lead to severe and systematic investment errors because they rely on intuitive judgments that are categorically different from the rational models on which investment decisions should be based.

Consider the following example from Montier (2007, 25): In performing calculations, the way equations are presented appears to have a significant influence on the result.

Two versions of the same calculation are shown below.

- (a)  $1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7 \times 8$
- (b)  $8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1$

In both cases the answer is 40,320. However, experiments have shown that using different ways of presenting this question of calculating the factorial of eight produces different results:

In (a) the median answer was 512.

In (b) the median answer was 2,250.

This test shows that when people are asked to make a decision—say a quantita-

tive assessment—their views can be significantly influenced by suggestions, e.g., how the numbers are presented. In this example, the answers are strongly influenced by the first numbers that appear in the question.

When faced with investment decisions, investors seem to get anchored in past price changes and the average prices of assets (Shefrin 2005, 51). Figure 1 shows that financial analysts also fall victim to quantitative anchoring: Their forecasts of the S&P 500 index from June 1991 to June 2004 were highly correlated to the past prices of the index (Montier 2005, 11).

In discussing moral anchors, Shiller (2005, 151–152) recalls *The Millionaire Next Door*, which was a best seller during the stock market boom of the 1990s (Stanley and Danko 1996). The book explained that most millionaires in the United States are not exceptional income earners but merely frugal savers—people who are not interested in buying a new car every year, for instance. The book's enticing story about investment millionaires, who save rather than spend their money, was just the kind of moral anchor needed to help sustain the unusual bull market during the mid to late 1990s.

Reasons to hold stocks or other investments also can take on ethical as well as practical dimensions. Our culture may supply reasons to hold stocks and other savings vehicles that are related to our sense of identity as responsible, good, or level-headed people.

### Loss Aversion/Prospect Theory

Loss aversion is the third type of heuristic bias with significant implications for the financial markets. Kahneman and Tversky (1979) introduced prospect theory, which analyzes the value that individuals assign to gains and losses (Gärdenfors and Sahlin 1988, 183–187).

Figure 2 illustrates prospect theory, showing that individuals assign a value to gains and losses that yields a value function. This value function is concave for gains (representing risk aversion) and convex for losses (representing risk seeking). Moreover, **because of loss aversion, the value function generally is steeper for losses than for gains.**

Prospect theory supports the following generalizations:

- People underweigh outcomes that are probable in comparison with outcomes that are expected to be obtained with certainty.
- People discard decision-making components that are shared by all prospects under consideration. For example, when comparing two cars—one blue, the other red—the evaluation will focus on color rather than the car itself because the decision maker assumes that cars have the same properties, even if they are very different from one model to another (e.g., Porsche versus Volkswagen).

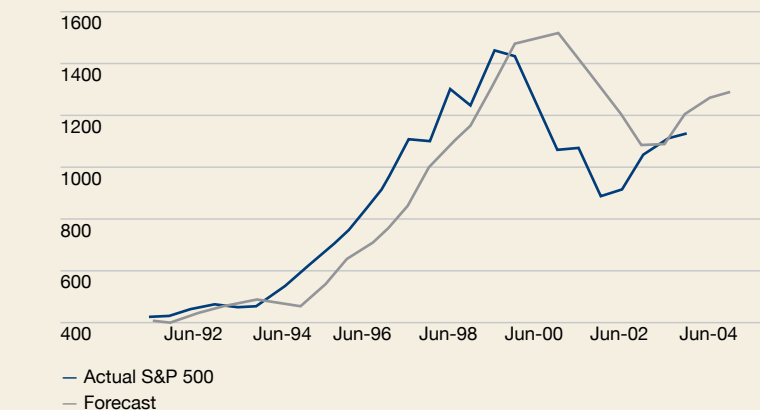
### Self-Deception Biases

Self-deception, or limits to learning, is the other key component of Hirshleifer's categorization in terms of influence on investors' decision-making. **Three of these self-deceptions are overoptimism, overconfidence, and confirmation bias.**

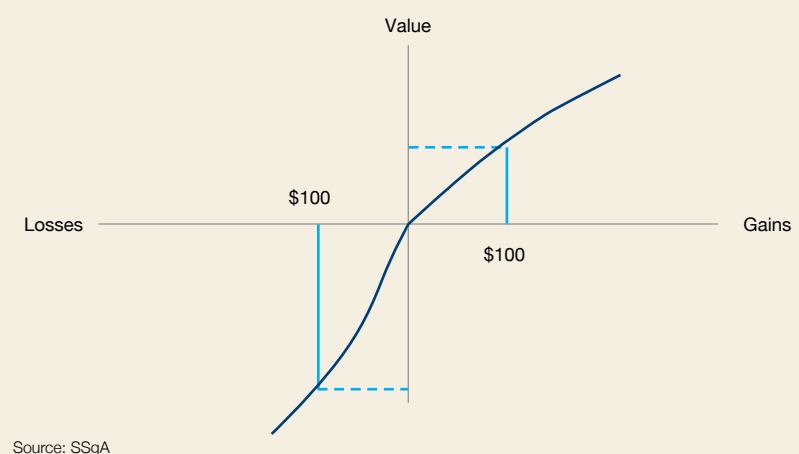
### Overoptimism

**Overoptimism describes the mental state in which people believe that things more likely will go well for them than poorly.** When playing a game, individuals are more inclined to think they will win than they will lose (Pompian 2006, 51). **Overoptimism also is the tendency**

**FIGURE 1: S&P 500 INDEX LEVEL COMPARED TO S&P 500 INDEX LEVEL FORECASTS**

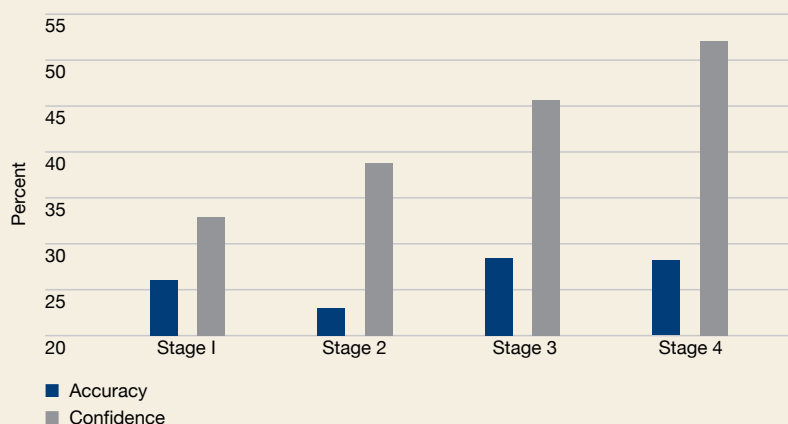


**FIGURE 2: PROSPECT THEORY**



**FIGURE 3: CFO SURVEY (AS OF DECEMBER 2010)**



**FIGURE 4: PSYCHOLOGISTS' ANSWERS—ACCURACY VERSUS CONFIDENCE**

Source: Kahneman et al. (1982, 287–288)

of individuals to exaggerate their own abilities. They suffer the illusion of control, believing they can influence outcomes over which they demonstrably have no influence.

Overoptimism is a common bias in all stock-market speculative bubbles. During periods of rising prices investors are overoptimistic about their investments. Even in market crashes, overoptimism still can help to explain investor behavior.

Intuitively, professionals who have experience in and broad knowledge of their fields should be more objective than laymen; they should learn from their experiences. Yet a 2010 Duke University survey of 500 U.S. chief financial officers (CFOs) regarding their optimism about the economy and their own firms contradicts this assumption.<sup>6</sup> Figure 3 shows that the CFOs surveyed were always more optimistic about their own firms than about the economy as a whole.

### Overconfidence

Overconfidence refers to individuals' faith in their abilities. Numerous psychological experiments have shown that people suffer from the illusion of knowledge—thinking they have better information than is actually the case. Various studies have documented two types of overconfidence:

**Prediction overconfidence:** People estimate within confidence intervals that are too narrow.

**Certainty overconfidence:** People are blind to adverse opinions.

In one experiment, psychologists were asked to answer questions regarding a patient's behavioral pattern (Kahneman et al. 1982, 287–288). The study was separated into four stages. At each stage, the psychologists received more information about the patient and were asked to answer the same questions regarding the patient's behavior pattern, attitudes, interests, and typical reactions to real life events. The accuracy of the psychologists' answers was measured in percentage terms versus the correct answers. At the end of each stage, the psychologists were asked to state how confident they were about the correctness of their answers.

Figure 4 displays the psychologists' levels of confidence compared with the accuracy of their answers at each of the four stages in the experiment.

The experiment highlighted that the psychologists showed significant overconfidence:

- The more information they received the more confident they became in their own judgments.
- The accuracy of the judgments does not correlate with the psychiatrists'

level of confidence at each of the four stages.

- The psychologists—and by extension experts in general, as research has shown—displayed overconfidence, while in fact not producing more-accurate responses (Montier 2007, 110).

Institutional investors are considered experts in finance. Yet they sometimes tend to be overconfident (Shiller 2005, 152), as in the example with the psychologists above. Institutional investors trade more than private investors because they think they possess special knowledge. They are thus overconfident, which leads to the following types of common mistakes (Pompian, 2006, 54):

- Overestimation of their ability to evaluate a company as a potential investment
- High turnover or frequent trading, which leads to lower returns
- Underdiversification of portfolios, which leads to taking more risk and underestimating the level of that risk

Shiller's survey about the 1987 crash showed that 47.9 percent of institutional investors thought, based on their expertise, that the market would rebound during the day of the crash because of their expertise in managing assets (Shiller 2005, 152).

A strong positive relationship exists between overoptimism and overconfidence. Research has shown, for example, that managerial decisions are affected by a combination of manager overoptimism and overconfidence. Overoptimistic managers overvalue the probability of their success and may employ aggressive business and accounting strategies that lead to higher discretionary accruals. These aggressive strategies are the consequence of overconfident behavior. Hence, overoptimism can lead to overconfidence. Overconfidence resulting from overoptimism highlights that investors are willing to pay very high prices

for stocks or items during speculative bubbles like the dot-com boom.

### Confirmation

Confirmation bias is the tendency to prefer information that confirms hypotheses or former conceptions whether or not these are true. People thus empower their beliefs and attitudes by selectively collecting new information or evidence to legitimize those beliefs (Bensley 1998, 137).

In a famous experiment in 1992, economists Forsythe, Nelson, Neumann, and Wright created a hypothetical stock market. While evaluating the performance of traders, they found that only a minority managed to generate high profits. More interestingly, the best-performing traders were the ones most able to resist confirmation bias (Hirshleifer 2001).

This experiment highlights the difficulty portfolio managers have in evaluating an investment while being bombarded by information. They already will have formed certain beliefs about individual investments and often stick to them rather than properly judging the information at hand.

These types of bias can be very dangerous for fundamental analysts and portfolio managers who need to be aware of the degree to which their judgment can be skewed by pre-existing views. During the dot-com bubble, for example, analysts appeared to need a large amount of new information in order to change views about any Internet stock even when the market was heading downward. Yet, from an objective point of view, a change in opinion would have been justified much earlier. In contrast to fundamental asset managers, quantitative managers cut out personal judgments by using mathematical models to construct portfolios.

### Social Biases

Herding is the key social bias that pertains to investment decision-making.

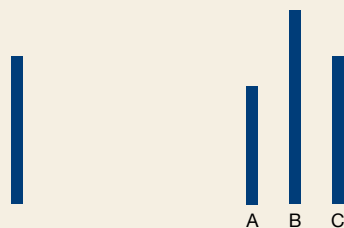
### Herding

The herding effect is a fundamental observation about human society and describes the finding that people who regularly communicate with one another think similarly. The effect was first noted by Solomon Asch,<sup>7</sup> an acclaimed social psychologist.

In 1952, Asch carried out an experiment that showed the immense power of social pressure on individual judgment. He placed each subject in a group of between seven and nine people (the “confederates”) who were unknown to the subject. Asch had coached the confederates before the experiment. The individuals in the group were asked to answer a sequence of 12 questions related to the length of the lines A, B, and C compared to the length of the left line in figure 5.

**FIGURE 5: THE SOLOMON ASCH EXPERIMENT**

Is line A, B, or C of the same length as the left line?




Source: Shiller (2005, 157–158.)

The answers were obvious, but the confederates deliberately gave incorrect answers to seven of the 12 questions. One-third of the time the subject gave the same wrong answers as the confederates. In addition, the participant often showed signs of anxiety or distress, suggesting that fear of being seen as different or foolish by the rest of the group swayed the participant's judgment.

Herding clearly arises in financial markets and explains a number of interesting empirical observations. Most notably, herding results in stock market speculative bubbles (Brunnermeier 2001, 165):

- When investors are bullish, they are willing to pay nearly any price while sellers only want to sell at a higher price. This combination pushes prices up.
- If every market participant is bearish, the opposite effect occurs, with prices being pushed down.
- Throughout the history of financial markets, investors who did not follow the mainstream were seen as foolish, even if they had sound explanations for their actions. Herding has a major impact on at least three common theories:
  1. The idea that all economic agents are independent of each other in making their decisions is false.
  2. The law of supply and demand, where higher prices are supposed to attract more sellers and deter buyers, is not immediate.
  3. The idea that asset prices give pure information about fundamentals is incorrect. Asset prices provide a mix of hard information and softer information such as the crowd's mood, which are difficult to untangle.

### Conclusion

This brief review highlights the implications of behavioral biases in investment decision-making, in particular that psychological mechanisms can lead to common investing mistakes. Unlike standard financial theory, behavioral finance theory offers some persuasive explanations for stock market anomalies, stock market crashes, and financial bubbles. 

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## Endnotes

- <sup>1</sup> Vernon Lomax Smith (1927– ) is professor of economics at Chapman University's Argyros School of Business and Economics and School of Law, a research scholar at George Mason University Interdisciplinary Center for Economic Science, and a fellow of the Mercatus Center in Arlington, Virginia. Smith shared the 2002 Nobel Memorial Prize in Economic Sciences with Daniel Kahneman. He is the founder and president of the International Foundation for Research in Experimental Economics and an adjunct scholar of the Cato Institute in Washington, DC.
- <sup>2</sup> Paul Slovic (1938– ) is a professor of psychology at the University of Oregon and the president of the Decision Research group. He earned a PhD in psychology from the University of Michigan in 1964. Slovic has studied psychological heuristics and published frequently with co-authors such as Daniel Kahneman and Amos Tversky. He was the first to theorize the affect heuristic and is considered one of the leading theorists and researchers in the risk-perception field.
- <sup>3</sup> Amos Nathan Tversky (1937–1996) was an American cognitive and mathematical psychologist. He was a pioneer of cognitive science and a long-time collaborator of Daniel Kahneman, who is a key figure in the discovery of systematic human cognitive bias and handling of risk.
- <sup>4</sup> Daniel Kahneman (1934– ) is an Israeli psychologist and Nobel laureate, notable for his work on the psychology of investors, the decision-making process, behavioral economics, and hedonic psychology.
- <sup>5</sup> David Hirshleifer is an American economist and professor who holds the Merage Chair in Business Growth at the University of California, Irvine. He previously held tenured positions at the University of Michigan, The Ohio State University, and the University of California, Los Angeles. He is known for his research on social learning, behavioral finance, and information cascades, which have contributed to a new understanding of why society is prone to fads and fashions, and why stock markets over- versus under-react. His articles have received several awards. He is the son

of Jack Hirshleifer (1925–2005), who was a prominent UCLA economics professor.

- <sup>6</sup> Optimism Index, published in Duke/CFO Magazine Global Business Outlook Survey 2010. This survey covers 500 CFOs of major U.S. companies and includes all sectors. See [www.cfosurvey.org](http://www.cfosurvey.org).
- <sup>7</sup> Solomon Eliot Asch (1907–1996) was a world-renowned American psychologist and pioneer in social psychology. He was born in Warsaw, Poland, and emigrated to the United States in 1920. He earned a master's degree in 1930 and a PhD in 1932, both from Columbia University. Asch was a professor of psychology at Swarthmore College for 19 years. He became famous in the 1950s with the Solomon Asch Experiment, which showed that social pressure can make a person say something that is obviously incorrect.

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