V. Excerpt

Irrational Exuberance

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Psychological Anchors for the Market

We have seen that the market is not well anchored by fundamentals. People do not even know to any degree of accuracy what the "right" level of the market is: not many of them spend much time thinking about what its level should be or whether it is over- or underpriced today. So what is it that ties down the market's level on any given day? What anchors the market? What is it that determines whether the Dow Jones Industrial Average is at 4,000 or 14,000? What ultimately limits the feedback from price changes to further price changes that amplifies speculative price movements? Why does the market stay within a certain region for days at a time, only to break out suddenly? We have already seen some partial answers to these questions, but to understand the true nature of the anchors at work here, we must also turn to psychology.

In considering lessons from psychology, it must be noted that many popular accounts of the psychology of investing are simply not credible. Investors are said to be euphoric or frenzied during booms or panic-stricken during market crashes. In both booms and crashes, investors are described as blindly following the herd like so many sheep, with no minds of their own. Belief in the rationality

of markets starts to sound a lot better when the only alternatives are such pop-psychological theories.

We all know that most people are more sensible during such financial episodes than these accounts suggest. Financial booms and crashes are, for most of us, not emotion-laden events on a par with victories in battle or volcanic eruptions. In fact, during the most significant financial events, most people are preoccupied with other personal matters, not with the financial markets at all. So it is hard to imagine that the market as a whole reflects the emotions described by these psychological theories.

However, solid psychological research does show that there are patterns of human behavior that suggest anchors for the market that would not be expected if markets worked entirely rationally. These patterns of human behavior are not the result of extreme human ignorance, but rather of the character of human intelligence, reflecting its limitations as well as its strengths. Investors are striving to do the right thing, but they have limited abilities and certain natural modes of behavior that decide their actions when an unambiguous prescription for action is lacking.[1]

Two kinds of psychological anchors will be considered here: *quantitative anchors*, which themselves give indications for the appropriate levels of the market that some people use as indications of whether the market is over- or underpriced and whether it is a good time to buy, and *moral anchors*, which operate by determining the strength of the reason that compels people to buy stocks, a reason that they must weigh against their other uses for the wealth they already have (or could have) invested in the market. With quantitative anchors, people are weighing numbers against prices when they decide whether stocks (or other assets) are priced right. With moral anchors, people compare the intuitive or emotional strength of the argument for investing in the market against their wealth and their perceived need for money to spend now.

Quantitative Anchors for the Market

Designers of questionnaires have learned that the answers people give can be heavily influenced by suggestions that are given on the

questionnaires themselves. For example, when people are asked to state within which of a number of ranges their income falls, their answers are influenced by the ranges given. The ranges serve as "anchors" to which they make their answers conform.

Psychologists have shown that people's decisions in ambiguous situations are influenced by whatever available anchor is at hand. When you must come up with an estimate, and you are unsure what to say, you take whatever number is before you. Psychologists Amos Tversky and Daniel Kahneman demonstrated this tendency clearly in an experiment involving a wheel of fortune: a large wheel with the numbers from 1 to 100 on it, similar to those used in television game shows, that is designed to stop at a random number when it is spun. Subjects were asked questions whose answers were numbers between 1 and 100, difficult questions such as the percentage of African nations in the United Nations. They were asked first to say whether the answer they would give was above or below the number just produced by the wheel of fortune. Then they were asked to give their answer. The experimenters found that the answer was quite substantially influenced by the random number on the wheel. For example, if the wheel stopped at 10, the median percentage of African nations according to their subjects was 25, whereas if the wheel stopped at 65, the median percentage was 45. This experiment was particularly interesting because it was designed so that the subject clearly knew that the number produced by the wheel was purely random and, moreover, because the number produced by the wheel should have had no emotional significance for the subject.[2]

In making judgments about the level of stock prices, the most likely anchor is the most recently remembered price. The tendency of investors to use this anchor enforces the similarity of stock prices from one day to the next. Other possible anchors are remembered past prices, and the tendency of past prices to serve as anchors may be part of the reason for the observed tendency for trends in individual stock prices to be reversed. Another anchor may be the nearest milestone of a prominent index such as the Dow, the nearest round-number level, and investors' use of this anchor may help explain unusual market behavior surrounding such levels. Past price

changes may also provide an anchor, if attention is suitably drawn to them. Recall from Chapter 4 that the drop in the market in the October 19, 1987, crash was nearly the same in percentage terms as that in the October 28–29, 1929, crash that was so much discussed at the time of the 1987 crash.

For individual stocks, price changes may tend to be anchored to the price changes of other stocks, and price-earnings ratios may be anchored to other firms' price-earnings levels. This kind of anchoring may help to explain why individual stock prices move together as much as they do, and thus ultimately why stock price indexes are as volatile as they are—why the averaging across stocks that is inherent in the construction of the index doesn't more solidly dampen its volatility.[3] It may also explain why stocks of companies that are in different industries but are headquartered in the same country tend to have more similar price movements than stocks of companies that are in the same industry but are headquartered in different countries, contrary to one's expectation that the industry would define the fundamentals of the company better than the location of its headquarters.[4] And it may explain why real estate investment trusts traded on stock exchanges tend to behave more like stocks than like the appraised value of their underlying commercial real estate.[5] Indeed all of these anomalies noted in financial markets have a simple explanation in terms of quantitative anchoring to convenient numbers.

Moral Anchors for the Market

With moral anchoring, the market is tied down by people's comparisons of the intuitive force of stories and reasons to hold their investments against their perceived need to consume the wealth that these investments represent. The market is not prevented from going up to arbitrarily high levels because people have any idea what its intrinsically "right" level is or what level would be too high. Rather, if the market were to get too high, the discrepancy between the wealth many people would then have in the market and their current living standards would, when compared with their reasons for holding stocks, encourage them to sell. One can appreciate the

nature of this anchor with an extreme example. Suppose, counterfactually, that the psychology of the market caused the level of the stock market to rise so as to make most holders of stocks multimillionaires—on paper. Then, unless the reason these people have to continue holding every single share is perceived to be extremely strong, they would want to start *living* a little more like multimillionaires and sell some of their stocks to be able to spend the money. Such selling would obviously bring stock prices down, since there would be no buyers, and obviously there just isn't sufficient current national income available to sustain anything like this many multimillionaires. The stock market can reach fantastic levels only if people think that they have good reasons not to test it by trying to enjoy their newfound wealth.

Underlying this notion of moral anchors is the psychological principle that much of the human thinking that results in action is not quantitative, but instead takes the form of *storytelling* and *justification*. That is why, in the case of moral anchors, people are weighing a story, which has no quantitative dimension, against the observed quantity of financial wealth that they have available for consumption. Such reasoning is not well described by the usual kind of economic theory, but there is a large amount of evidence in support of the assertion that investor reasoning does take this form.

Psychologists Nancy Pennington and Reid Hastie have shown the importance of stories in decision making by studying how jurors reached decisions in difficult cases. They found that jurors' approach to reasoning through the complicated issues of the trial tended to take the form of constructing a story, filling out the details that were provided to them about the case into a coherent narrative of the chain of events. In describing their verdict, they tended not to speak of quantities or probabilities, or of summing up the weight of the evidence, but rather merely to tell a story of the case, typically a chronology of events, and to remark how well their story fit together and how internally consistent it was.[6]

By analogy, those who sell stocks to the general public often tend to tell a story about the stock, a vivid story describing the history of the company, the nature of the product, and how the public is using the product. The sales call does not as often engage in discussions

of quantities or probabilities, or of whether the price is at the right level in terms of quantitative evidence about future dividends or earnings. These quantitative factors are not as congenial to the narrative-based decision making that comes naturally to people.

There is a basic human interest in gambling, seen in one form or another in all cultures,[7] an interest that also expresses itself in speculative markets. Some of the attraction to gambling, despite odds that are often openly stacked against gamblers, apparently has to do with narrative-based thinking. When gamblers are heard talking, they are usually telling stories, not evaluating probabilities, and the possibilities suggested by the stories often seem to have more substantive reality than any quantitative concepts. In these stories, gamblers use a different vocabulary than do probability theorists, preferring the words *luck* or *lucky day*, and rarely uttering the words *probability* or *likelihood*. There are stories of their winnings and losses, of the chains of events that preceded their best or worst luck, of the strength of their intuition that yielded good bets. These stories can convey a sense of meaning and significance to events that are in fact purely random.[8]

It has been noted that employees have a tendency to invest in company stock (that is, stock issued by the firm that employs them), even though it would appear to be more in their interest to diversify away from the source of their own livelihood. About a third of assets in large retirement savings plans are invested in company stock, and in some companies, such as Coca-Cola, company stock reaches 90% of assets.[9] This tendency to invest in company stock can be interpreted as consistent with investors' being influenced by stories: they know many more stories about their own companies and so invest in those companies' stocks.

People also appear to want to construct simple reasons for their decisions, as if they feel the need to justify those decisions in simple terms—if not to others, then to themselves. The need to have a simple reason to explain a decision is similar to the need to have a story behind a decision; both the stories and the reasons are simple rationales that can be conveyed verbally to others.

Psychologists Eldar Shafir, Itamar Simonson, and Amos Tversky demonstrated experimentally an effect that appears to represent

decision biases caused by people's search for simple reasons to justify decisions. They presented their subjects with a simple choice between two options: one option was "impoverished," with no striking positive or negative features. The other was "enriched," displaying both distinctly positive and distinctly negative features. In one of their experiments, subjects were asked to choose to which parent they would award sole custody of a child. Parent A, the impoverished option, was described with the words "average income, average health, average working hours, reasonable rapport with the child, and relatively stable social life." Parent B, the enriched option, was described with the words "above-average income, very close relationship with the child, extremely active social life, lots of work-related travel, minor health problems." The experimenters found that the subjects' choices depended on how they were asked about the two choices. When a group of subjects was asked to select the parent to whom they would award custody, 64% chose Parent B. When a second group was asked to pick the parent to whom they would *deny* custody, 55% again chose Parent B. The predominant answers given by the two groups are logically inconsistent, but they are consistent with a feeling that one must have a solid reason to justify a decision. The psychologists found that the same tendency occurs even for purely personal decisions that will never need to be explained to others.[10]

Reasons to hold stocks or other investments 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 people, as good or levelheaded people. *The Millionaire Next Door*, a best-seller since 1996, makes the point that most millionaires in the United States are not exceptional income earners, but merely frugal savers: average folks who are not enticed by a new car every year, an extravagant house, or other such money pits.[11] This book is not only an interesting study of millionaires; it also projects a subtle message suggesting the moral superiority of those who hold and gradually accumulate wealth over a lifetime. It therefore provides an attractive reason to save and invest. The book offers no analyses of price-earnings ratios or anything remotely like specific investment advice, thus subtly

reinforcing the impression that these are irrelevant. Instead, it offers lots of stories of successful, frugal people, many of whom prospered during the recent bull market—stories with vivid details and great immediacy for readers. The book's enticing story about investing millionaires who do not test the market by trying to cash out and consume their wealth is just the kind of moral anchor needed to help sustain an unusual bull market.

Overconfidence and Intuitive Judgment

In judging the significance of these psychological anchors for the market, it is important to bear in mind that there appears to be a pervasive human tendency toward *overconfidence* in one's beliefs. People are ready to act on stories or reasons that one might think they should have little confidence in.

People think they know more than they do. They like to express opinions on matters they know little about, and they often act on these opinions. We have all observed at one time or another that there are a lot of know-it-alls out there. But psychologists have described the tendency toward overconfidence with some care and indications of its generality.

Psychologists Baruch Fischhof, Paul Slovic, and Sarah Lichtenstein showed that if people are asked simple factual questions (such as which of two popular magazines has the higher circulation or which of two common causes of death is the more frequent) and are then asked to give the probability that their answer is right, they tend to overestimate the probability that they are right. In fact, when people said they were certain they were right they were in fact right only about 80% of the time.[12]

This result has been the subject of controversy among psychologists, and the overconfidence phenomenon has not been found to be universal. It has been shown that people can sometimes be trained out of their overconfidence in the experimental setting.[13] Yet some basic tendency toward overconfidence appears to be a robust human character trait: the bias is definitely toward overconfidence rather than underconfidence. I find that overconfidence is apparent when I interview investors; they seem to express overly strong opinions and rush to summary judgments.

Psychologists have long wondered why it is that people seem to be overconfident. One theory has been that, in evaluating the soundness of their conclusions, people tend to evaluate the probability that they are right on only the last step of their reasoning, forgetting how many other elements of their reasoning could be wrong.[14] Another theory is that people make probability judgments by looking for similarities to other known observations, and they forget that there are many other possible observations with which they could compare.[15] The reason for overconfidence may also have to do with hindsight bias, a tendency to think that one would have known actual events were coming before they happened, had one been present then or had reason to pay attention.[16] Hindsight bias encourages a view of the world as more predictable than it really is.

Another factor in overconfidence as it relates to speculative markets is *magical thinking*. When we speak of people's intuition about the likelihood that investments will do well or poorly and their own decisions to invest, we are speaking of their innermost thoughts—thoughts that they do not have to explain or justify to others. Patterns of thought referred to as "magical thinking" or "quasi-magical thinking" by psychologists are likely to play a role. People have occasional feelings that certain actions will make them lucky even if they know logically that the actions cannot have an effect on their fortunes.

People will make serious decisions based on thinking that they would, if pressed, admit was illogical. It has been shown that people will place larger bets on a coin that has not yet been tossed than on a coin that has already been tossed (and for which the outcome has been concealed). And people will, if asked how much money they would demand to part with a lottery ticket they already hold, give a figure over four times greater if they themselves chose the lottery number on the ticket. Apparently, at some magical level people think that they can influence a coin that has not yet been tossed and influence the likelihood of winning the lottery by choosing the number.[17]

Based on such experimental results, it seems clear that people are capable of thinking, at least at some intuitive level, "If I buy a stock, then it will go up afterwards" or "If I buy a stock, then others will probably want to buy the stock, too, because they are like me"

or "I have a hot hand lately; my luck is with me." Such thinking is likely, in a subtle way, to contribute to the overconfidence that may help the propagation of speculative bubbles.

Another aspect of overconfidence is that people tend to make judgments in uncertain situations by looking for familiar patterns and assuming that future patterns will resemble past ones, often without sufficient consideration of the reasons for the pattern or the probability of the pattern repeating itself. This anomaly of human judgment, called the *representativeness heuristic*, was demonstrated in a number of experiments by psychologists Tversky and Kahneman.

For example, these researchers asked people to guess the occupation, from a list of occupations, of people with a given personality description. If the description given was that the person was artistic and sensitive, they tended to choose conductor or sculptress, rather than laborer or secretary, disregarding entirely the fact that the former occupations are extremely rare and thus that the answers are much less likely to be right.[18] It would be wiser, in answering such questions, almost never to guess the occupation conductor or sculptress, since the base rate probabilities are so low. But people look for the best-fit occupation, disregarding the base rate probabilities.

Economists Nicholas Barberis, Andrei Shleifer, and Robert Vishny have developed the representativeness heuristic into a theory of investors' selective overconfidence and into a psychological theory of an expectational feedback loop. These authors argue that investors, when they see stock prices move in the same direction for a while, gradually begin to assume that the trend is representative of many trends that they have seen in other economic data. According to a psychological principle of conservatism, people are slow to change their opinions. For this reason, it takes some time before investors begin to conclude that the trend will continue. The interplay between the representativeness heuristic and the principle of conservatism determines the speed at which the speculative feedback progresses.[19]

Overconfidence, however generated, appears to be a fundamental factor promoting the high volume of trade we observe in speculative markets. Without such overconfidence, one would

think that there would be little trading in financial markets. If people were completely rational, then half the investors should think that they are below average in their trading ability and should therefore be unwilling to do speculative trades with the other half, who they think will probably dominate them in trading. Thus the above-average half would have no one to trade with, and there should ideally be no trading for speculative reasons.[20]

Overconfidence in judgments can at times influence people to believe that they know when a market move will take place, even if they generally believe as an intellectual matter that stock prices are not forecastable. In the survey that I carried out of investors right after the crash of October 19, 1987, I asked them, "Did you think at any point on October 19, 1987, that you had a pretty good idea when a rebound was to occur?" Of individual investors who had bought on that day, 47.1% said yes; of institutional investors, 47.9% said yes. Thus nearly half of those trading that day thought they knew what the market would do that day. I find this remarkable. Even among all individual investors, most of whom did not buy or sell at all on that day, 29.2% answered yes to this question; among all institutional investors, 28.0% answered yes.

Why would anyone think that they knew what the market would do on any given day, and especially on such a tumultuous day? The idea that one would know such things stands contrary to the most elementary observations about markets' forecastability, and contrary to the conventional wisdom that accurate market timing is very difficult. Quite a few people apparently do not consistently believe that the market is never very forecastable.

The next question on the questionnaire was, "If yes, what made you think you knew when a rebound would occur?" There was a striking absence of solid grounding for the answers. References were made to "intuition," "gut feeling," "historical evidence and common sense," or "market psychology." Mentions of concrete facts or references to explicit theories were rare, even among the institutional investors.

These intuitive feelings about the future course of the market were extremely important for the course of the stock market crash, for apparently it was these intuitive judgments that set the anchors

that stopped the price decline. To understand speculative bubbles, positive or negative, we must appreciate that overconfidence in one's own intuitive judgments plays a fundamental role.

The Fragility of Anchors: Difficulty Thinking Ahead to Contingent Future Decisions

The anchors discussed here account for the stability of the market from day to day, but we must also account for the ability of these anchors to let loose occasionally—sometimes suddenly. Markets do make dramatic shifts. Part of the reason for the surprises the market hands us from time to time is that news events have an effect on people's reasons that even they could not have expected.

Psychologists Shafir and Tversky have described a phenomenon they call *nonconsequentialist reasoning:* reasoning that is characterized by an inability to think through the elementary conclusions one would draw in the future if hypothetical events were to occur. According to Shafir and Tversky, people cannot decide until the events actually occur. When we learn to play games of logic, for example chess, we must practice thinking ahead to the decisions we will make in the future in response to the other player's decisions. One learns to think, "If I move here, then she might move either here or there, and if she moves here I will be fine, but if she moves there I will be faced with a difficult situation. . . ." That is, one learns to think through the ramifications of all relevant branches of a decision tree. In everyday life we to some extent practice the same modes of thinking that we learned in playing these games. But real-world decisions are clouded by emotions and a lack of clearly defined objectives, and people do not generally behave as if they have thought things through well in advance.

Shafir and Tversky give an example of students' decision making about whether to take a vacation in Hawaii after learning whether they had passed or failed an important exam. Faced with such a choice, they look into their own minds for their feelings about the choice. Some students who have passed the exam will think, "I should take the vacation as a celebration and a reward." Some students who have failed the exam will think, "I should take the vacation as a consolation, to improve my mood after having failed." Some students will decide to take a vacation whether or not they pass the exam. Those students who would take the vacation in either case should be able, if they were fully logical, to book the vacation well in advance of the exam, knowing that the information about the outcome of the exam is not really relevant to their decision. But these people sometimes have great difficulty making such a choice before they know the outcome of the exam. Before the exam, they cannot fully anticipate the emotional reason for taking the vacation, and so they cannot feel good about committing themselves to it.[21]

Although this example presents a situation in which the difficulty people face is in deciding how they themselves will feel in the future, rather than in deciding on questions of simple fact as in the game of chess, in reality decisions about investments are likely to have as much of an emotional component as decisions about whether to go on a vacation.

For this reason, the effects of news stories on the stock market sometimes have more to do with discovery of how we *feel* about the news than with any logical reaction to the news. We can make decisions then that would have been impossible before the news was known. It is partly for this reason that the breaking off of a psychological anchor can be so unpredictable: people discover things about themselves, about their own emotions and inclinations, only *after* price changes occur.

Psychological anchors for the market hook themselves on the strangest things along the muddy bottom of our consciousness. The anchor can skip and drag, only to snag again on some object whose strength would surprise us if we saw it at the surface. We have considered in this chapter some of the psychological factors that explain the nature of such anchors. But the anchors can have significance for the market as a whole only if the same thoughts enter the minds of many. In the next chapter, we turn to the social basis of thinking: the tendencies toward herd behavior and the contagion of ideas.

Eight

Herd Behavior and Epidemics

A fundamental observation about human society is that people who communicate regularly with one another think similarly. There is at any place and in any time a *Zeitgeist*, a spirit of the times. It is important to understand the origins of this similar thinking, so that we can judge the plausibility of theories of speculative fluctuations that ascribe price changes to faulty thinking. If the millions of people who invest were all truly independent of each other, any faulty thinking would tend to average out, and such thinking would have no effect on prices. But if less-than-mechanistic or irrational thinking is in fact similar over large numbers of people, then such thinking can indeed be the source of stock market booms and busts.

Part of the reason people's judgments are similar at similar times is that they are reacting to the same information—the information that was publicly available at that time. But, as we shall see in this chapter, rational response to public information is not the only reason that people think similarly, nor is the use of that public information always appropriate or well reasoned.

Social Influence and Information

Acclaimed social psychologist Solomon Asch reported an experiment in 1952 that he interpreted—and that was widely interpreted by others—as showing the immense power of social pressure on individual judgment. His paper was published at a time of widespread public concern with the effects of Communist propaganda, alarm at the apparently successful brainwashing techniques of Chinese Communists, and continuing puzzlement over the ability of the Nazis in Germany to obtain an obedient response when ordering mass exterminations of Jews and other "undesirables." Asch's findings were widely cited in the media as providing a scientific basis for claims that people do not have fully independent judgment. His results are still cited today; those who found serious flaws in his interpretation of those results are not nearly as well remembered.

In his famous experiment, Asch placed the subject into a group of seven to nine other people who were, unbeknownst to the subject, confederates who had been coached by Asch. The entire group was asked to answer a sequence of twelve questions about the lengths of line segments shown to them on cards, and the subject would hear most of the others' answers before giving his own answer before the group. The correct answers to the questions were obvious, but the confederates deliberately gave wrong answers to seven of the twelve questions. Faced with a group of people who were unanimously giving what seemed to be obviously wrong answers to the questions, a third of the time the subjects caved in and gave the same wrong answers as had been given by the confederates. Furthermore the subjects often showed signs of anxiety or distress, suggesting that fear of being seen as different or foolish before the group had swayed their judgment.[1]

Asch explained his results as due to social pressure. There is probably some validity to this interpretation, but it turns out that the subjects' wrong answers were not primarily due to such pressure. Three years after Asch published his findings, psychologists Morton Deutsch and Harold Gerard reported a variant of Asch's

experiment in which the subjects were told that they had been placed *anonymously* into a group of people, people that they never saw and never would see, and whose answers they could observe only indirectly through an electronic signal. (In fact there was really no group at all.) Subjects could give their answers to the questions merely by pressing a button, unobserved by others, so that there was no need to stand up to a group face to face. Otherwise, the experiment proceeded as it had under Asch. And the subjects gave nearly as many wrong answers as they had before.[2]

Deutsch and Gerard concluded that the wrong answers in the Asch experiment had been given in large part because people simply thought that all the other people could not be wrong. They were reacting to the *information that a large group of people had reached a judgment different from theirs*, rather than merely the fear of expressing a contrary opinion in front of a group. This behavior is a matter of rational calculation: in everyday living we have learned that when a large group of people is unanimous in its judgment on a question of simple fact, the members of that group are almost certainly right. The anxiety and distress that Asch's subjects expressed may have come partly from their conclusion that their own senses were somehow not reliable.

Another widely cited series of experiments relevant to herd behavior is Stanley Milgram's investigations of the power of authority. In Milgram's experiments, the subject was asked to administer electric shocks to another person sitting close by, who was, again unbeknownst to the subject, a confederate. There really were no electric shocks, but the confederate pretended to be experiencing them, feigning pain and suffering. The confederate asserted that he was in great distress and asked that the experiment be stopped. But when the experimenter told the subjects to continue administering the shocks, insisting that the shocks would cause no permanent tissue damage, many did so.[3]

These results were widely interpreted as demonstrating the enormous power of authority over the human mind. Indeed the results may be understood partly on those terms. But there is another interpretation: that people have learned that when experts tell them something is all right, it probably is, even if it does not

seem so. (In fact, it is worth noting that in this case the experimenter was indeed correct: it *was* all right to continue giving the "shocks"—even though most of the subjects did not suspect the reason.) Thus the results of Milgram's experiment can also be interpreted as springing from people's past learning about the reliability of authorities.[4]

Asch's and Milgram's studies are as interesting as ever when viewed from the standpoint of this information-based interpretation. The experiments demonstrate that people are ready to believe the majority view or to believe authorities even when they plainly contradict matter-of-fact judgment. And their behavior is in fact largely rational and intelligent. Most people have had many prior experiences of making errors when they contradicted the judgments of a larger group or of an authority figure, and they have learned from these experiences. Thus the Asch and Milgram experiments give us a different perspective on the overconfidence phenomenon: people are respectful of authorities in formulating the opinions about which they will later be so overconfident, transferring their confidence in authorities to their own judgments based upon them.

Given the kind of behavior observed by Asch and Milgram, it is not at all surprising that many people are accepting of the perceived authority of others on such matters as stock market valuation. Most must certainly trust their own judgment in this area even less than the experimental subjects trusted the evidence of their own eyes about the lengths of lines on cards or the pain and suffering that a person sitting next to them was experiencing.

Economic Theories of Herd Behavior and Information Cascades

Even completely rational people can participate in herd behavior when they take into account the judgments of others, and even if they know that everyone else is behaving in a herdlike manner. The behavior, although individually rational, produces group behavior that is, in a well-defined sense, irrational. This herdlike behavior is said to arise from an *information cascade*.[5]

Info Cascades

A simple story will illustrate how such an information cascade could get started. Suppose two restaurants open next door to each other. Each potential customer must choose between the two. Would-be customers may be able to make some judgments about the quality of each of the restaurants when viewing it through the front window, but such judgments will not be very accurate. The first customer who arrives must choose based only on viewing the two empty restaurants and makes a choice. However, the next potential customer can rely not only on his or her own information, based on the appearance of the restaurants, but also—by seeing the first customer eating in one or the other of the restaurants—information about the choice made by the first customer. If the second customer chooses to go to the same restaurant as the first, the third customer will see two people eating in that restaurant. The end result may be that all customers may wind up eating at the same restaurant—and it could well be the poorer restaurant, since there was no real consideration of the combined evidence inherent in all their observations about the two restaurants. If all of them had been able to pool their first impressions and discuss these as a group, they might have been able to deduce which restaurant was likely to be the better one. But in this scenario they cannot make use of each other's information, since they do not reveal their own information to others when they merely follow them.

The restaurant story, and the economic theory that underlies it, is not in itself a theory of stock market bubbles. However, it has clear relevance to stock market behavior, and it can provide a foundation for a theory about how rational investors may be led astray.[6] According to such a theory, the popular notion that the level of market prices is the outcome of a sort of vote by all investors about the true value of the market is just plain wrong. Hardly anyone is really voting. Instead people are rationally choosing not to, as they see it, waste their time and effort in exercising their judgment about the market, and thus choosing not to exert any independent impact on the market. Ultimately, all such information cascade theories are theories of *the failure of information about true fundamental value to be disseminated and evaluated.*

It is important to emphasize that this failure to disseminate information to others can be modeled in economic theory in terms of

purely rational behavior with no limitations of intelligence, only limitations of revealed information. But to achieve a better understanding of the issues relevant to financial market mispricing, one must also understand some parameters of human behavior, of limitations of human information processing, that are relevant to the transmission of information and the potential for speculative bubbles.

Human Information Processing and Word of Mouth

The human mind is the product of evolution almost entirely in the absence of the printed word, e-mail, the Internet, or any other artificial means of communication. Human society has been able to conquer almost all habitats of this planet primarily because of its own innate information processing ability. A fundamental component of this information processing ability is effective communication of important facts from one person to another.

This superior ability to communicate knowledge has been made possible over the past few million years by evolutionary changes within the human brain that have optimized the channels of communication and created an emotional drive to communicate effectively. It is because of this emotional drive that most people's favorite activity is conversation. Look around you. Everywhere you go, when two or more people are not working or playing or sleeping (and, in some cases, even when they are doing these things), they are talking. The incessant exchange of information is a fundamental characteristic of our species. The information that tends to flow most rapidly is the kind that would have helped society in centuries past in its everyday living: information about such things as food sources, dangers, or other members of society.

For this reason, in modern society there is likely to be rapidly spreading conversation about a buying opportunity for a hot stock, or about immediate threats to personal wealth, or about the story of the people who run a company. These topics resemble the kinds of things our ancestors have talked about since time immemorial. But conversation seems to flow less well about abstract topics, such as the mathematics of finance, or statistics about asset returns,

or optimal levels of saving for retirement. Transmission of such knowledge is of course effortful, infrequent, and imperfect.

Face-to-Face Communications versus Media Communications

The conventional media—print media, television, and radio—have a profound capability for spreading ideas, but their ability to generate active behaviors is still limited. Interpersonal and interactive communications, particularly face-to-face or word-of-mouth communications, still have the most powerful impact on our behavior.

In a 1986 study of individual investors, John Pound and I sought to determine how their attention was first drawn to a stock. We mailed a questionnaire to a random sample of individual investors and asked them to consider the company whose stock they had purchased most recently. We asked, "What first drew your attention to the company?" Only 6% specified periodicals or newspapers. The majority of the answers named sources that would involve direct interpersonal communication.[7] Even if people read a lot, their attention and actions appear to be more stimulated by interpersonal communications.

The power of interpersonal, word-of-mouth communication about investments has been amply illustrated by the work of the market surveillance units at the exchanges and within the Securities and Exchange Commission. Their brief is to detect insider trading, and to that end they carefully follow the trail of communications among individual investors. Court documents reveal, for example, that a sequence of word-of-mouth communications was touched off in May 1995, when a secretary at IBM was asked to photocopy documents that included references to IBM's top-secret takeover of Lotus Development Corporation, a deal scheduled to be announced on June 5 of that year. She apparently told only her husband, a beeper salesman. On June 2, he told another person, a co-worker, who bought shares eighteen minutes later, and another friend, a computer technician, who initiated a sequence of phone calls. By the time of the June 5 announcement, twenty-five people connected to this core group had spent half a million dollars on the investment based on this tip. They included a pizza chef, an electrical engineer, a bank executive, a dairy wholesaler, a former schoolteacher, a gynecologist, an attorney, and four stockbrokers.[8] Clearly word-of-mouth communication can proceed with great speed and across disparate social groups.

Word-of-mouth transmission of ideas appears to be an important contributor to day-to-day or hour-to-hour stock market fluctuations, even though direct word-of-mouth transmission cannot proceed across the nation quite as fast as markets move. In the questionnaire survey of investors that I sent out during the week of the stock market crash of 1987 (described in detail in Chapter 4), I asked them about word-of-mouth communications. Of the individual investor respondents, 81.6% said that they had learned of the crash before 5 P.M. on the same day. Thus they had learned of the crash from sources other than the next day's morning newspaper or that day's evening news. The average time of day that these investors heard of the crash was 1:56 P.M. Eastern Daylight Time (EDT). For institutional investors, the average time that they heard of the crash was 10:32 A.M. EDT. Individual investors reported talking on average to 7.4 other people about the market situation on the day of the crash; institutional investors reported talking on average to 19.7 other people.

The channels of human communication that we know today seem to favor the interpersonal face-to-face and word-of-mouth communication that developed over millions of years of evolution, during times when such communication was virtually the only form of interpersonal communication. The patterns of communication hard-wired into our brains rely on there being another person's voice, another person's facial expressions, another person's emotions, and an associated environment of trust, loyalty, and cooperation. Because these elements are missing from the written or electronic word, people find it somewhat more difficult to react to these sources of information. They cannot give these other sources the same emotional weight, nor can they remember or use information from these other sources as well. This is an important reason why we still have teachers—why we cannot tell our children to simply sit down and read books or rely on computer-aided instruction.

It is also for this reason that television is such a powerful medium, in that it mimics much of the appearance of direct interpersonal conversation. Watching television simulates the very action—the voices, faces, and emotions—that we experience in conversation. Indeed, television advertisers often recreate images of everyday conversation about their products. But television today is still not interactive; the communication it offers is only one-way, and so it is still not as effective as direct person-to-person communication.

The telephone, invented well over a hundred years ago, may still be the most important artificial medium for interpersonal communication today, because it so closely simulates face-to-face communications, lacking only the visual stimuli. Studies by sociologists and communications researchers have found that telephone conversations come very close to face-to-face communications in information transmission and problem-solving functions, though they still fall somewhat short in conflict-resolution and person-perception functions.[9]

The impact of the telephone appears to have been a factor behind the volatile stock market of the 1920s. Although the telephone was invented in 1876, it did not become economical, effective, and widely used until a number of improvements had been made, such as the invention in 1915 of vacuum tube amplification of longer-distance telephone calls. By the mid-1920s the average person was making over two hundred telephone calls per year in the United States. The 1920s saw the spread of "boiler rooms" and "bucket shops" that actively sold stocks to the public using the telephone, employing questionable tactics that easily slipped past ineffective "blue-sky" legislation at the level of the states. The proliferation of telephones undoubtedly made it easier to sell stocks to the public, and the resulting impetus to fraud helped bring the country to the point of enacting the Securities Act of 1933 and the Securities Exchange Act of 1934, which created the Securities and Exchange Commission.[10]

Today we are witnessing another explosion of technological innovations that facilitate interpersonal communication, consisting of e-mail, chat rooms, and interactive Web sites. These new and

effective media for interactive (if not face-to-face) communication may have the effect of expanding yet again the interpersonal contagion of ideas. They may have allowed enthusiasm for the market to spread much more widely in the 1990s than it would otherwise have. Certainly we are still learning how to regulate the use of these new media in the public interest.

Although e-mail and chat rooms are significant changes in the technology of communications, it is not clear that their advent is more significant than that of the telephone many decades ago. Because the telephone allows communication of emotions as expressed vocally, it may yet be a better simulator of effective communication than e-mail or chat rooms in their usual configuration.

Continued technological progress in those computer-based communications media that allow better simulation of face-to-face communication will undoubtedly make the transmissibility of ideas more effective in the future. For example, according to the market research firm International Data Corporation, desktop and compact videoconferencing systems, which allow users to see the faces of others during a conversation over a distance, are just now becoming economical enough for wide use; the installed base worldwide is expected to climb from 622,000 endpoints in 1998 to 4.2 million by 2003.[11]

Epidemic Models Applied to Word-of-Mouth Communication

The mathematical theory of the spread of disease has been used by epidemiologists to predict the course of infection and mortality.[12] These models can be used to better understand the transmission of attitudes and the nature of the feedback mechanism supporting speculative bubbles.

In the simplest epidemic model, it is assumed that the disease has a given *infection rate* (the rate at which the disease spreads from contagious people to susceptible people) and a given *removal rate* (the rate at which infected people become no longer contagious, through recovery or death).

If the removal rate is zero, the graphical plot of the number of infected people after the introduction of one contagious person follows a mathematical curve called the *logistic curve*.[13] With the logistic curve, the percent of the population that is infected rises initially at the infection rate. Although the rate of increase is nearly constant at first, the absolute number of people recorded as contracting the disease rises faster and faster: as more and more people become contagious, more and more people become infected and are seen in doctors' offices complaining of the first symptoms of the disease. But the rate of increase starts to decline as the pool of yet-to-be-infected susceptibles begins to be depleted. Even though the intrinsic infection rate of the disease is unchanged, the rate at which new infected people are being produced declines because those who are infected meet fewer people who have yet to become infected. Eventually the entire population is infected and the logistic curve becomes flat, at 100%; then of course there are no new cases.

If the removal rate is greater than zero, but less than the infection rate, the model predicts instead that the course of the epidemic will be bell shaped: the number of infectives will at first rise from zero, peak, and then drop back to zero. The peak can occur before 100% of the population is ever infected.

If the removal rate is greater than the infection rate, then the epidemic will never get started and never even be observed.

Epidemiologists use these models constructively to understand the pattern of disease outbreaks. Using such models they can infer, for example, that if the removal rate is just above the infection rate, then a nearly healthy population is in danger of an epidemic, for any small uptick in the infection rate or downtick in the removal rate can tip the balance toward a new epidemic. Thus epidemiologists can infer that a change in weather patterns that will tend to keep people indoors together (where they are more likely to infect each other) may cause the infection rate to increase above the removal rate. The epidemic will then begin, but the absolute number of infectives will grow slowly at first. If, in this example, the weather changes fairly soon again in such a way that the infection rate is brought back down, so that the number of infectives never

becomes very large, then the epidemic will fail to be noticed by the general public. But if the bad weather lingers long enough relative to the difference between the bad-weather-infection rate and the removal rate, then the epidemic will become large and noticeable in the population at large. Epidemiologists can use this model to predict, according to this example, how long a spell of bad weather is necessary to produce a serious epidemic.

The same kind of epidemic models have been applied to other biological phenomena that may have relevance to financial markets. Economist Alan Kirman has used them to model the behavior of ants in exploiting food sources, and he notes that the models also seem relevant to stock market price changes.[14] It has been found experimentally that ants, when presented with two identical food sources near their nest, tend to exploit both sources, but one more intensively than another. Over time (and as the experimenter constantly replenishes the food sources so that they remain exactly equal), the primary attention of the ants may switch from one source to the other. Why should they not exploit the two equally, and what causes them to switch their attention? Kirman notes that ants *individually* recruit other ants to food sources; there is no central direction for the nest as a whole. Recruitment is done by contact and following (tandem recruitment) or by laying a chemical trail (pheromone recruitment). Both of these processes are the ant equivalent of word-of-mouth communication. Kirman shows that if there is randomness in the recruitment process, the experimentally observed phenomena can be explained in terms of a simple epidemic model.

Although disease spread and ant behavior are of theoretical interest in our consideration of stock market bubbles, of greatest practical relevance is the fact that epidemic models have been applied by sociologists to predict the course of word-of-mouth transmission of ideas.[15] The dynamics of such transmission may mimic that of disease. The formal mathematical theory of epidemics appears, however, to be less accurate for modeling social processes than for modeling disease spread or ant behavior, and it has yet to spawn an influential and successful literature by social scientists. This lack of success may be explained by the fact that the basic

parameters of these models are not as constant in the social sciences as in biological applications.

One reason for the lack of success in applying epidemic models to the spread of ideas may be that the mutation rate, the rate of transmission errors, is much higher for ideas than for disease or other biological processes. Many of us recall the children's game of telephone, in which the first person selects a simple story and whispers it into the ear of the second person, who then whispers it into the ear of the third, and so on. When the story is finally told to the group by the last person in the chain, the distortion of the original story is often so dramatic as to provoke laughter. The person-to-person transmission of stories of any complexity is just not very reliable.

For this reason, pure word-of-mouth transmission of ideas, even if abetted by the telephone, is not likely to extend widely enough to infect an entire nation all by itself. The accuracy of transmission will falter long before that happens. In contrast, computer-to-computer transmission is unerring. Computer viruses can spread nationally and internationally with no alteration whatsoever. But viruses do not have the ability to change people's thinking; they do not get beyond the machine. The ability of users of e-mail to forward others' messages or to provide Web links effectively permits word of mouth to spread unerringly. And new technology that makes it possible and natural to forward word-of-mouth messages from others as part of a telephone conversation or a video conference would again dramatically improve the accuracy and persistence of interpersonal communications.

Although the imprecision and variability of interpersonal communications as they currently occur prevent formal mathematics from predicting with any reliability how ideas spread, epidemic models are still helpful in understanding the kinds of things that can bring about changes in market prices. For example, it is useful to consider that any change in the infection rate or removal rate will change the rate of spread of new ideas.

Thus, for example, a major national news story unrelated to financial markets may lower the infection rate of ideas related to speculative markets by deflecting attention from them. This phenomenon may help explain why, as noted in Chapter 4, stock price movements are not notoriously volatile at times of national crisis despite the potential importance of such crises for the nation's businesses and why most large stock market movements occur when there is not much other news. On the other hand, national news that ties in with or encourages discussion of the stock market may raise the infection rate. This may be part of the explanation for the Internet's apparently exaggerated effect on the stock market: attention being paid to the Net promotes conversation about technology stocks in general, thereby raising the infection rate for theories about these stocks.

The word-of-mouth transmission of ideas does not have to infect the entire nation to affect national stock prices. Moreover, word of mouth may function to amplify public reaction to news events or to media accounts of such events. It is still necessary to consider the infection rate relative to the removal rate in order to understand the public impact of any new idea or concept, since most people's awareness of any of these is still socially mediated. Thus the likelihood of any event affecting market prices is enhanced if there is a good, vivid, *tellable* story about the event.

The importance of a tellable story for keeping the infection rate of ideas high can be seen in many examples drawn from new-product marketing, such as the promotion of motion pictures. Marketers launch an ad campaign as the movie is first screened, to attract the attention of especially receptive people. Only a small fraction of the population responds directly to the initial advertisements. Yet the success of the movie ultimately depends on the reaction of these people to the film—and the opinions they pass on to others. It is well known that the advice of movie critics has less impact than the mass effect of such word of mouth. Producers have learned over the years the importance of including set pieces in movies. These are scenes that in and of themselves have story quality, scenes that, either during a screening or even as part of a trailer, pack word-of-mouth potential analogous to that of popular jokes or tall tales—or stories linked to high-flying companies on the nation's exchanges.

By analogy, news events that are more likely to be transmitted in informal conversations are in turn more likely to contribute to the contagion of ideas. The dry, analytical outlook an expert may offer for the nation's economy is very unlikely to be transmitted by word of mouth. In contrast, news that the market has made a sudden move is vastly more likely to be communicated. To be sure, experts' opinions sometimes tag along with news stories about price movements, but they are seldom vivid enough to become the focus of word-of-mouth communications by themselves.

Word-of-mouth communications, either positive or negative, are an essential part of the propagation of speculative bubbles, and the word-of-mouth potential of any event must be weighed in judging the likelihood of that event to lead to a speculative bubble. Thus, for example, the predictions of widespread computer problems due to the so-called Y2K bug was a classic word-of-mouth story because of its association with both the nation's fascination with computers and the new millennium. Thus—although fears ultimately provided groundless—it was likely to have an exaggerated impact on the market when compared with other less vivid stories.

A Pool of Conflicting Ideas Coexisting in the Human Mind

One reason why the contagion of ideas can sometimes happen rapidly, and why public thinking can experience such abrupt turnarounds, is that the ideas in question are already in our minds. Even conflicting ideas can coexist at the same time in our minds, and a shift in supporting facts or public attentions may suddenly bring to the fore an apparent belief that contradicts formerly stated beliefs.

For example, people widely believe that the stock market is unforecastable and that market timing is futile. But they also believe (as we saw in Chapter 3) that if the stock market were to crash, it would surely come back up. Such views are clearly inconsistent.

One explanation for the fact that people are able to hold such conflicting views simultaneously is that they *think* they have heard both views endorsed by experts. The culture transmits a number

of supposed facts, often attributed only to "them," as in "They say that. . . ." When stories are casually accepted on some imagined authority, conflicts are likely.

Sometimes, stories achieve currency even though they can be traced to no competent authority whatsoever. One hears again and again, for example, that "they say" that only 10% of the human brain is actually used by most people—a myth that extends back to the nineteenth century, when neurological science was clearly incapable of either establishing or disproving such a fact. "They say" also that the birth rate in New York City jumped nine months after a 1965 power blackout left New Yorkers with nothing to do for a while: but there was no jump in the birth rate.[16] And, more apropos, "they say" that there were an unusually high number of suicides at the time of the crash of 1929, but there were not.[17] Stories that are useful in conversations, and in media presentations, have a currency often unrelated to the facts.

Given this tendency to attribute views to real or imagined experts, people do not worry much about apparent contradictions among the views they hold. There is a willingness to free ride here—to suppose that the experts have thought through the apparent contradictions and therefore to assume that the experts know why they are not in fact contradictions at all. It is certainly true that sometimes theories that appear to be contradictory really are not. And from there it is but a short step to the supposition that the experts could explain away most apparent contradictions—if one asked.

People's thinking about the arcane field of investments is surely clouded with many half-thought-through ideas that may be mutually contradictory, or at least have not been put into any coherent analytical framework. It is a real challenge to try to infer what these ideas will mean for concrete investment decisions.

The significance of the fact that contradictory views are held simultaneously is that people may have no clear attachment to many of their views. Therefore we cannot attach too much credence to investors' stated belief that the market will surely come back up after a crash, for the circumstances of the actual crash could bring to the forefront other, contradictory views that would explain away a lack of market resilience. Investors would then react in ways

that could not have been foreseen based on their previously expressed confidence.

Socially Based Variations in Attention

The human brain is structured to have essentially a single focus of conscious attention at a time, and to move rapidly from one focus to another. The sensory experience that comes to us from our environment is vastly complicated, and the brain manages to filter out almost all of this complexity to produce a sense of the here and now—an interpretation of what is most important at present—and a sequence of thoughts that weave in this interpretation. Thus, for example, when one is sitting in an airport waiting to board one's plane, one's attention constantly returns to the theme "waiting to board" and organizes many thoughts and observations around it, as if it were the essence of current reality. One usually does not study the weave of the carpet or the smudges of dirt on the windows, or ponder the shape of the letters on the information screen, though in principle one could. These details are typically beyond our consciousness, even though we are receiving, and processing, sensory information about them.

The ability to focus attention on important things is one of the defining characteristics of intelligence, and no one really understands how the brain does it. Failure to focus attention on the proper things is also one of the most characteristic of human judgment errors. The mechanism for focusing attention that has evolved in the human brain, although remarkable, is still far from perfect.

If one looks back on some of the most significant errors one has made in life, one is likely to find that these often arose from a failure to pay attention to details. One would have responded instantly and changed one's actions had someone repeatedly demanded attention and pointed out certain key facts. Thus, in understanding errors that people have made in the past, it is important to consider what it was that they were *not* paying attention to.

One of the mechanisms that the brain has evolved to direct attention properly is a socially based selectivity. We pay attention to many of the same things that others around us are paying

attention to. This social basis for attention allows individuals who recognize the importance of some information to bring it to the attention of other members of the community, and it creates a view of the world and an information set that are common to the community. Such a view and information set allow the community to act well in concert. At the same time, the social component of attention does not work perfectly, and it may cause errors to be made in common by the entire group because the common focus of attention pushes aside attention to details that individuals might otherwise notice. As with individual attention, the phenomenon of social attention is one of the great creations of behavioral evolution and is critical for the functioning of human society, but it is also an imperfect creation.

The social attention mechanism generates a sudden focus of the attention of the entire community on matters that appear to be emergencies. Thus, to return to the epidemic model, the infection rate may suddenly and dramatically increase. A sudden major move in the stock market is one of those events that pushes aside all other conversation.

This social basis for attention, operating by word of mouth and facilitated by media transmission of ideas, can generate attention focuses that spread rapidly across much of the world. With a substantial fraction of the human minds on the planet suddenly grabbed by the market, it should not be at all surprising that markets on opposite sides of the globe move together, even if the fundamentals in different countries do not suggest any reason for such co-movement.

People Cannot Explain Changes in Their Attention

Furthermore, people often find it very difficult to explain what made them decide to take a certain course of action; the original attentional trigger may not be remembered. This is a principal reason why changes in speculative asset prices, which very quickly reflect changes in attention, often seem so inexplicable.

Price changes themselves may be an attention grabber, even among professional investors. In a study of institutional investors'

choice of individual stocks, John Pound and I produced a list of stocks whose prices had increased rapidly within the preceding year and that also had high price-earnings ratios. We then obtained a list of institutional investors who had reported to the Securities and Exchange Commission that they had bought one of the stocks (the experimental group) and compared these with a list of institutional investors in a random sample of stocks (the control group). We asked respondents on both lists if they agreed with the following statement regarding their stock (the rapid-price-increase stock for the experimental group or the random stock for the control group): "My initial interest was the result of my, or someone else's, systematic search over a large number of stocks (using a computerized or similar search procedure) for a stock with certain characteristics."[18] Since these were investment professionals, it is perhaps not surprising that 67% of the random sample, the control group, said they agreed with this statement. But, among the experimental group, the investors in the rapid-price-increase stocks, only 25% agreed. Since attentional triggers are often poorly remembered, we cannot *expect* them to tell us that the price increase stimulated their interest, but our experimental design shows that the price increase, or associated events, did play a role in attracting their attention. The important point is that most of the investors in rapid-price-increase stocks themselves say that they were unsystematic in their decision making.

When variations in attention are important causes of changing behavior, we cannot expect people to tell us the reasons for their changed behavior. People usually cannot easily explain what drew their attention to something, and so they cannot explain their own behavior. A 1931 experiment by psychologist N. R. F. Maier will illustrate. Maier presented his subjects with the problem of tying two cords together: cords that were suspended from the ceiling far enough apart that one could not reach them both at the same time unless they were somehow brought together. Subjects were given a number of tools with which to attempt this task and were asked to see how many different ways they could invent to tie the two cords together. One way to complete the task was to tie a weight to the end of one of the cords, set it swinging like a pendulum, grab

the end of the other cord with one hand, and then catch the swinging cord with the other hand. When the experimenter himself set one of the cords swinging, many subjects quickly came up with this idea. But when asked how they had hit upon the idea, only a third of them mentioned having seen the swinging cord. The swinging cord merely changed the focus of their attention, and most subjects could not see the connection between their actions and the stimulus that had given them the idea.[19]

By analogy, a stock market boom can start for no better reason than that some factor, like the swinging cord, calls attention to the market. In the context of the present stock market situation, such events as spotting an ad for a mutual fund or the receipt of election forms for an employer's 401(k) plan may be the swinging cord. But we will never learn about the importance of these stimuli from most of our subjects by simply asking them. Even if people recall the stimuli, they will not be able to tell us *how* they affected them.

The Story So Far

This chapter concludes the essence of my argument that *irrational exuberance* is at work in producing the elevated stock market levels we have seen recently. We began in Part I with a list of twelve precipitating factors, whose effect is sometimes amplified via feedback loops and naturally occurring Ponzi schemes, aided by the lubricant of the news media as sometime promoter of market exuberance. We saw evidence of strangely high investor confidence and undiminished expectations for the market.

We then considered, in Part II, the cultural components of exuberance, the varying degrees of social attention to new era theories, and the tendencies of these new era theories both to react to the market and to stimulate it temporarily. In Part III we have stepped back and examined some of the basic psychological factors that allowed the changes described in the earlier parts to exert their effects. Chapter 7 showed how trivial and barely visible psychological anchors may ultimately determine market levels, and how investor overconfidence can strengthen the pull of these anchors. The present chapter has attempted to resolve the essential puzzle

of the current market situation: that we see newly high valuations but cannot detect a cause for those valuations that is associated with rational public thinking.

In the remainder of the book, I place the theory of irrational exuberance into a broader context. In the next part, I consider some influential arguments against the notion that anything irrational is going on. In the concluding chapter, I turn to the ultimate questions that this exuberance poses for policy: individual, institutional, and governmental.