Behavioural Finance and the Psychology of Investing

"The investor's chief problem, and even his worst enemy, is likely to be himself."

—Benjamin Graham

"There are three factors that influence the market: Fear, Greed, and Greed."

—Market folklore

Be honest: Do you think of yourself as a better than average driver? If you do, you are not alone. About 80 percent of the people who are asked this question will say yes. Evidently, we tend to overestimate our abilities behind the wheel. Is the same thing true when it comes to making investment decisions? ■

You will probably not be surprised when we say that human beings sometimes make errors in judgment. How these errors, and other aspects of human behaviour, affect investors and asset prices falls under the general heading of "behavioural finance." In the first part of this chapter, our goal is to acquaint you with some common types of mistakes investors make and their financial implications. As you will see, researchers have identified a wide variety of potentially damaging behaviours. In the second part of the chapter, we describe a trading strategy known as "technical analysis." Some investors use technical analysis as a tool to try to exploit patterns in prices. These patterns are thought to exist (by advocates of technical analysis) because of predictable behaviour by investors.

9.1 Introduction to Behavioural Finance

behavioural finance The area of finance dealing with the implications of investor reasoning errors on investment decisions and market prices.

Sooner or later, you are going to make an investment decision that winds up costing you a lot of money. Why is this going to happen? You already know the answer. Sometimes you make sound decisions, but you just get unlucky when something happens that you could not have reasonably anticipated. At other times (and painful to admit) you just make a bad decision, one that could have (and should have) been avoided. The beginning of investment wisdom is to recognize the circumstances that lead to poor decisions and thereby cut down on the damage done by investment blunders.

As we previously noted, the area of research known as **behavioural finance**[1] attempts to understand and explain how reasoning errors influence investor decisions and market prices. Much of the research done in the area of behavioural finance stems from work in the area of cognitive psychology, which is the study of how people, including investors, think, reason, and make decisions. Errors in reasoning are often called *cognitive errors*.

Some proponents of behavioural finance believe that cognitive errors by investors will cause market inefficiencies. Recall that in a previous chapter, we identified three economic conditions that lead to market efficiency: (1) investor rationality, (2) independent deviations from rationality, and (3) arbitrage. For a market to be inefficient, all three of these conditions must be absent. That is, it must be the case that a substantial portion of investors make irrational investment decisions, and the collective irrationality of these investors then must lead to an overly optimistic or pessimistic market situation that cannot be corrected via arbitrage by rational, well-capitalized investors. Whether this actually occurs in financial markets is the subject of a raging debate, and we are not going to take sides. Instead, our goal is to introduce you to the ideas and issues.

CHECK THIS ✓

9.1a What is behavioural finance?

9.1b What three conditions must be absent for a market to be inefficient?

9.2 Prospect Theory

prospect theory An alternative theory to classical, rational economic decision making, which emphasizes, among other things, that investors tend to behave differently when they face prospective gains and losses.

Prospect theory, developed in the late 1970s, is a collection of ideas that provides an alternative to classical, rational economic decision making. The foundation of prospect theory rests on the idea that investors are much more distressed by prospective losses than they are happy about prospective gains. Researchers have found that a typical investor considers the pain of a $1 loss to be about twice as great as the pleasure received from the gain of $1. Also, researchers have found that investors respond in different ways to identical situations. The difference depends on whether the situation is presented in terms of losses or in terms of gains.

Investors seem to be willing to take more risk to avoid the loss of a dollar than they are to make a dollar profit. Also, if an investor has the choice between a sure gain and

[1]The following researchers have conducted pioneering work in behavioural finance: Shiller, De Bondt, Thaler, Odean, Kahneman and Tuersky.

a gamble that could increase or decrease the sure gain, the investor is likely to choose the sure gain. Choosing a sure gain over a gamble is called *risk-averse behaviour.* If the same investor is faced with a sure loss and a gamble that could increase or decrease the sure loss, the investor is likely to take the gamble. Choosing the gamble over the sure loss is called *risk-taking behaviour.*

This focus on gains and losses and the tendency of investors to be risk-averse with regard to gains, but risk-taking when it comes to losses, is the essence of prospect theory. In contrast, a fully rational investor (in an economic sense) is presumed to care only about his or her overall wealth, not the gains and losses associated with individual pieces of that wealth.

To give a simple example, suppose you own just two stocks (which is, of course, a bad idea from a diversification standpoint). On a particular day, one stock goes up sharply, but the other goes down so that your total wealth is unchanged. On another day, neither stock changes price at all. In both cases, your total wealth was unaffected, but in the first case you would probably be upset that your big gain was cancelled out. If you are, you are focusing on the individual pieces, not the big picture. As we will see in the next few subsections, this kind of thinking can lead to potentially damaging errors in judgment.

Frame Dependence

If an investment problem is presented in two different (but really equivalent) ways, investors often make inconsistent choices. That is, how a problem is described, or framed, seems to matter to people. Some people believe that frames are transparent; that is, investors should be able to see through the way the question is asked. Do they? Do you? Try this: Jot down your answers in the following two scenarios.

Scenario One. Suppose we give you $1,000. You have the following choice:

  A. You can receive another $500 for sure.
  B. You can flip a fair coin. If the coin-flip comes up heads, you get another $1,000, but if it comes up tails, you get nothing.

Scenario Two. Suppose we give you $2,000. You have the following choice:

  A. You can lose $500 for sure.
  B. You can flip a fair coin. If the coin-flip comes up heads, you lose $1,000, but if it comes up tails, you lose nothing.

What were your answers? Did you choose option A in the first scenario and option B in the second? If that's what you did, you are guilty of just focusing on gains and losses, and not paying attention to what really matters, namely, the impact on your wealth. However, you are not alone. About 85 percent of the people who are presented with the first scenario choose option A, and about 70 percent of the people who are presented with the second scenario choose option B.

If you look closely at the two scenarios, you will see that they are actually identical. You end up with $1,500 for sure if you pick option A, or else you end up with a 50-50 chance of either $1,000 or $2,000 if you pick option B. So you should pick the same option in both scenarios. Which option you prefer is up to you, but the point is that you should never pick option A in one scenario and option B in the other. But people do this because the phrasing, or framing, of the question leads people to answer the questions differently. This phenomenon is known as *frame dependence*.

Our frame dependence example offers several important investment lessons. First, an investor can always frame a decision problem in broad terms (like wealth) or in narrow terms (like gains and losses). Second, broad and narrow frames often lead the investor to make different choices. Although using a narrow frame (like gains and losses) is human nature, doing so can lead to irrational decisions. Therefore, using broad frames, like overall wealth, results in better investment decisions.

Mental Accounts and Loss Aversion

When you add a new stock to your portfolio, it is human nature for you to associate the stock with its purchase price. As the price of the stock changes through time, you will have unrealized gains or losses when you compare the current price to the purchase price. Through time, you will mentally account for these gains and losses, and how you feel about the investment depends on whether you are ahead or behind. This behaviour is known as **mental accounting**.

mental accounting
Associating a stock with its purchase price.

When you engage in mental accounting, you unknowingly have a personal relationship with each of your stocks. As a result, selling one of them becomes more difficult. It is as if you have to "break up" with this stock, or "fire" it from your portfolio. As with personal relationships, these "stock relationships" can be complicated and, believe it or not, make selling stocks difficult at times.

In fact, you may have particular difficulty selling a stock at a price lower than your purchase price. If you sell a stock at a loss, you may have a hard time thinking that purchasing the stock in the first place was correct. You may feel this way even if the decision to buy was actually a very good decision. A further complication is that you will also think that if you can just somehow "get even," you will be able to sell the stock without any hard feelings. This phenomenon is known as **loss aversion**, which is the reluctance to sell investments such as shares of stock after they have fallen in value. Loss aversion is also called the "break-even" or "disposition effect," and those suffering from it are sometimes said to have "get-evenitis." Legendary investor Warren Buffett offers the following advice: "The stock doesn't know you own it. You have feelings about it, but it has no feelings about you. The stock doesn't know what you paid. People shouldn't get emotionally involved with their stocks."

loss aversion
A reluctance to sell investments after they have fallen in value. Also known as the *breakeven* or *disposition effect*.

To see if you are likely to suffer from loss aversion, consider the following two investments:

> **Investment One**. A year ago, you bought shares in Fama Enterprises for $40 per share. Today, these shares are worth $20 each.

> **Investment Two**. A year ago, you bought shares in French Company for $5 per share. Today, these shares are worth $20 each.

What will you do? Will you (1) sell one of these stocks; (2) sell both of these stocks; (3) hold one of these stocks; or (4) hold both of these stocks?

Because you are reading about loss aversion, you will undoubtedly recognize that if you choose to keep the shares in Fama Enterprises, you might be suffering from loss aversion. Why do we say might? Well, consider this. Suppose you are considering a new investment in Fama Enterprises. Does your rational analysis say that it is reasonable to purchase shares at $20? If the rational answer is no, then you should sell. If the rational answer is yes, then you do not suffer from loss aversion. However, if you argued to yourself that if shares in Fama Enterprises were a good buy at $40, then they must be a steal at $20, you probably have a raging case of loss aversion. So, to summarize, there are two important lessons from this example:

- **Lesson One**: The market says that shares in Fama Enterprises are worth $20. The market does not care that you paid $40 a year ago.

- **Lesson Two**: You should not care about your purchase price of Fama Enterprises either. You must evaluate your shares at their current price.

How about the shares in French Company? Do you sell them and take the profit? Once again, the lessons are the same. The market says that shares in French Company are worth $20 per share today. The fact that you paid $5 a year ago is not relevant. Note that selling either of these stocks has tax consequences. Your careful analysis should acknowledge the existence of taxes and transaction fees, and their impact on the net proceeds available to you after you sell a security.

How destructive is loss aversion? Perhaps the most famous case of loss aversion, or "get-evenitis," occurred in 1995, when 28-year-old Nicholas Leeson caused the collapse of his employer, the 233-year-old Barings Bank. At the end of 1992, Leeson had lost about £2 million, which he hid in a secret account. By the end of 1993, his losses were about £23 million, and they mushroomed to £208 million at the end of 1994 (at the time, this was $512 million). Instead of admitting to these losses, Leeson gambled more of the bank's money in an attempt to "double-up and catch-up." On February 23, 1995, Leeson's losses were about £827 million ($1.3 billion) and his trading irregularities were uncovered. Although he attempted to flee from prosecution, he was caught, arrested, tried, convicted, and imprisoned. Also, his wife divorced him.

It is unlikely that you will suffer from a case of loss aversion as severe as Nicholas Leeson's, but loss aversion does affect everyday investors. For example, we know that individual investors sell "winners" more frequently than they sell "losers." If a typical individual investor had 100 stocks with unrealized gains, the investor might sell 15 of them and keep 85. If the same investor had 100 stocks with unrealized losses, the investor would tend to sell 10 of them and keep 90. That is, individual investors are typically about 1.5-times more likely to sell a stock that has gone up in price than they are to sell a stock that has fallen in price.

This effect is worse when investors hold mutual funds. With mutual funds, when investors choose to sell, they are more than 2.5 times as likely to sell a winning fund than a losing fund. How about professional money managers who manage the mutual funds? They also suffer from loss aversion.

House Money

Casinos in Las Vegas (and elsewhere) know all about a concept called "playing with house money." The casinos have found that gamblers are far more likely to take big risks with money that they have won from the casino (i.e., the "house money"). Also, casinos have found that gamblers are not as upset about losing house money as they are about losing the money they brought with them to gamble.

It may seem natural for you to feel that some money is precious because you earned it through hard work, sweat, and sacrifice, whereas other money is less precious because it came to you as a windfall. But these feelings are plainly irrational because any dollar you have buys the same amount of goods and services no matter how you obtained that dollar. The lessons are:

- **Lesson One**. There are no "paper profits." Your profits are yours.

- **Lesson Two**. All your money is your money. That is, you should not separate your money into bundles labelled "house money" and "my money."

Let us return to the shares of Fama Enterprises and French Company. Suppose both were to decline to $15. You might feel very differently about the decline depending on

which stock you looked at. With Fama Enterprises, the decline makes a bad situation even worse. Now you are down $25 per share on your investment. On the other hand, with French Company, you only "give back" some of your "paper profit." You are still way ahead. This kind of thinking is playing with house money. Whether you lose from your original investment or from your investment gains is irrelevant.

Frame dependence, mental accounting, and the house money effect are all consistent with the predictions of prospect theory. Many other types of judgment errors have been documented. Here are a few examples:

- **Myopic loss aversion**: This behaviour is the tendency to focus on avoiding short-term losses, even at the expense of long-term gains. For example, you might fail to invest "retirement" money into stocks because you have a fear of loss in the near term.

- **Regret aversion**: This aversion is the tendency to avoid making a decision because you fear that, in hindsight, the decision would have been less than optimal. Regret aversion relates to myopic loss aversion.

- **Sunk cost fallacy**: This mistake is the tendency to "throw good money after bad." An example is to keep buying a stock or mutual fund in the face of unfavourable developments.

- **Endowment effect**: This effect is the tendency to consider something that you own to be worth more than it would be if you did not own it. Because of the endowment effect, people sometimes demand more money to give up something than they would be willing to pay to acquire it.

- **Money illusion**: If you suffer from a money illusion, you are confused between real buying power and nominal buying power (i.e., you do not account for the effects of inflation).

CHECK THIS ✓

9.2a What is the basic prediction of prospect theory?

9.2b What is frame dependence?

9.2c How are mental accounting and loss aversion related?

9.3 Overconfidence

A serious error in judgment you can make as an investor is to be overconfident. We are all overconfident about our abilities in many areas (recall our question about your driving ability at the beginning of the chapter). Here is another example. Ask yourself: What grade will I receive in this course (in spite of the arbitrary and capricious nature of the professor)? In our experience, almost everyone will either say A or, at worst, B. Sadly, when we ask our students this question, we always feel confident (but not overconfident) that at least some of our students are going to be disappointed.

Concerning investment behaviour, overconfidence appears in several ways. The classic example is diversification, or the lack of it. Investors tend to invest too heavily in the company for which they work. When you think about it, this loyalty can be very bad financially. This is because both your earning power (your income) and your retirement nest egg depend on one company.

Other examples of the lack of diversification include investing too heavily in the stocks of local companies. You might also do this because you read about them in the local news

or you know someone who works there. That is, you might be unduly confident that you have a high degree of knowledge about local companies versus distant companies.

Overconfidence and Trading Frequency

If you are overconfident about your investment skill, you are likely to trade too much. You should know that researchers have found that investors who make relatively more trades have lower returns than investors who trade less frequently. Based on brokerage account activity over a particular period, researchers found that the average household earned an annual return of 16.4 percent. However, those households that traded the most earned an annual return of only 11.4 percent. The moral is clear: Excessive trading is hazardous to your wealth.

Overtrading and Gender: "It's (basically) a guy thing"

In a study published in 2001, Professors Brad Barber and Terrance Odean examined the effects of overconfidence. Two possible effects of overconfidence are that it leads to more trading and more trading leads to lower returns. If investors could be divided into groups that differed in overconfidence, then these effects could be examined.

Barber and Odean use the fact that psychologists have found that men are more overconfident than women in the area of finance. So, do men trade more than women? Do portfolios of men underperform the portfolios of women? Barber and Odean show that the answer to both questions is yes.

Barber and Odean examine the trading accounts of men and women and find that men trade about 50 percent more than women. They find that both men and women reduce their portfolio returns through excessive trading. However, men do so by 94 basis points more per year than women. The difference is even bigger between single men and single women. Single men trade 67 percent more than single women, and single men reduce their return by 144 basis points compared to single women.

Using four risk measures, and accounting for the effects of marital status, age, and income, Professors Barber and Odean also find that men invested in riskier positions than women. Young and single people held portfolios that displayed more return volatility and contained a higher percentage of stocks in small companies. Investors with higher incomes also accepted more market risk. These results are comforting because it seems to make sense that the relatively young and the relatively wealthy should be willing to take more investment risk, particularly if they do not have dependents. Professors Yuce and Yap (2006) examined the investment behaviour of male and female Canadian students who participated in an investment game and invested $1,000,000 and formed portfolios of different financial assets. Risk aversion levels showed that female students are statistically more risk averse than the male students. All female students avoided futures and options investments, the risky derivative instruments. Their results also showed that female groups did not get the top 5 returns or the bottom 5 returns; instead they obtained middle range returns, because they invested in safer instruments.

What is a Diversified Portfolio to the Everyday Investor?

It is clear to researchers that most investors have a poor understanding of what constitutes a well-diversified portfolio. Researchers have discovered that the average number of stocks in a household portfolio is about four, and the median is about three.

Ask yourself: What percentage of these households beat the market? If you are like most people, your answer is too low. Researchers have found, however, that even when accounting for trading costs, about 43 percent of the households outperformed the market. Surprised? The lack of diversification is the source of your surprise.

Think about it like this. Suppose all investors held just one stock in their account. If there are many stocks, about half the individual stock returns outperform the market average. Therefore, about half the investors will beat the market. Quickly: Did you think that you would certainly be in that half that would beat the market? If you did, this should show you that you might be prone to overconfidence.

CHECK THIS ✓
9.3a   How does overconfidence appear in investment behaviour?
9.3b   What are the effects of trading frequency on portfolio performance?

9.4   Misperceiving Randomness and Overreacting to Chance Events

representativeness heuristic Concluding that causal factors are at work behind random sequences.

Cognitive psychologists have discovered that the human mind is a pattern-seeking device. As a result, we conclude that causal factors or patterns are at work behind sequences of events even when the events are truly random. In behavioural finance, this is known as the **representativeness heuristic**, which says that if something is random, it should look random. But what does random look like?

Suppose we flip a coin 20 times and write down whether we get a head or a tail. Then we do it again. The results of our two sets of 20 flips are:

First 20: T T T H T T T H T T H H H T H H T H H H
Second 20: T H T H H T T H T H T H T H T T H T H T H H

Do these sequences of heads and tails both look random to you? Most people would say that the first 20 and the second 20 somehow look "different," even though both are random sequences and both have 10 heads and 10 tails.

Let's look at this a bit differently by graphing the results. We'll start at zero. If a head occurs, we will subtract one; if a tail occurs, we will add one. Table 9.1 lists the results. Suppose we graph the two sets of 20 flips in Figure 9.1. Do the two series look different to you? Do you think the line labelled First 20 has a pattern to it, but the line labelled Second 20 appears to be random? If you do, your mind saw a pattern in a random sequence of coin flips, even though both patterns are the result of random coin flips with 10 heads and 10 tails.

The "Hot-Hand" Fallacy

Basketball fans generally believe that success breeds success. Suppose we look at the recent performance of two basketball players named LeBron and Shaquille. Both of these players make half of their shots. But LeBron just made two shots in a row, while Shaquille just missed two shots in a row. Researchers have found that if they ask 100 basketball fans which player has the better chance of making the next shot, 91 of them will say LeBron, because he has a "hot hand." Further, 84 of these fans believe that it is important for team-mates to pass the ball to LeBron after he has made two or three shots in a row.

But—and the sports fans among you will have a hard time with this—researchers have found that the hot hand is an illusion. That is, players really do not deviate much from their long-run shooting averages, although fans, players, announcers, and coaches think they do. Cognitive psychologists actually studied the shooting percentage of one professional basketball team for a season. The findings are presented in Table 9.2. Detailed analysis of shooting data failed to show that players make or miss shots more or less frequently than what would be expected by chance. That is, statistically speaking, all the shooting percentages in Table 9.2 are the "same."

TABLE 9.1			The Results of Two Sets of 20 Coin Flips			
	First 20 Flips			**Second 20 Flips**		
Flip Number	**Result**	**+1/−1**	**Accumulated Sum**	**Result**	**+1/−1**	**Accumulated Sum**
			0			0
1	T	1	1	T	1	1
2	T	1	2	H	−1	0
3	T	1	3	T	1	1
4	H	−1	2	H	−1	0
5	T	1	3	H	−1	−1
6	T	1	4	T	1	0
7	T	1	5	T	1	1
8	H	−1	4	H	−1	0
9	T	1	5	T	1	1
10	T	1	6	H	−1	0
11	H	−1	5	T	1	1
12	H	−1	4	H	−1	0
13	H	−1	3	T	1	1
14	T	1	4	T	1	2
15	H	−1	3	H	−1	1
16	H	−1	2	T	1	2
17	T	1	3	H	−1	1
18	H	−1	2	T	1	2
19	H	−1	1	H	−1	1
20	H	−1	0	H	−1	0
Number of heads	10			10		
Number of tails	10			10		

FIGURE 9.1

The Pattern of Two-Different Sets of 20 Coin Flips
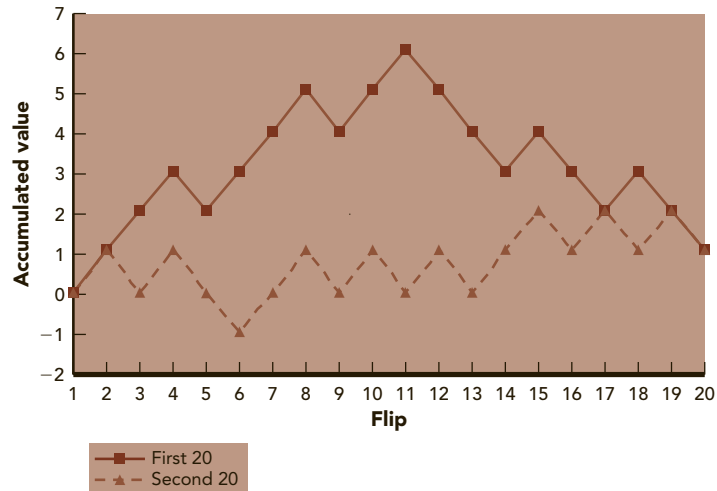
TABLE 9.2	Shooting Percentages and the History of Previous Attempts
Shooting Percentage on Next Shot	**History of Previous Attempts**
46%	Made 3 in a row
50	Made 2 in a row
51	Made 1
52	First shot of the game
54	Missed 1
53	Missed 2 in a row
56	Missed 3 in a row

The shooting percentages in Table 9.2 may suggest that teams will try harder to stop a shooter who has made the last two or three shots. To take this into account, researchers have also studied free throw percentages. Researchers told fans that a certain player was a 70 percent free throw shooter and was about to shoot two foul shots. They asked fans to predict what would happen on the second shot if the player

1. Made the first free throw.

2. Missed the first free throw.

Fans thought that this 70 percent free throw shooter would make 74 percent of the second free throws after making the first free throw, but would only make 66 percent of the second free throws after missing the first free throw. Researchers studied free throw data from a professional basketball team over two seasons. They found that the result of the first free throw does not matter when it comes to making or missing the second free throw. On average, the shooting percentage on the second free throw was 75 percent when the player made the first free throw. On average, the shooting percentage on the second free throw was also 75 percent when the player missed the first free throw.

It is true that basketball players shoot in streaks. But these steaks are within the bounds of long-run shooting percentages. So it is an illusion that players are either "hot" or "cold." If you are a believer in the "hot hand," however, you are likely to reject these facts because you "know better" from watching your favourite teams over the years. You are being fooled by randomness, because randomness often appears in clusters.

clustering illusion
Human belief that random events that occur in clusters are not really random.

The **clustering illusion** is our human belief that random events that occur in clusters are not really random. For example, it strikes most people as very unusual if heads comes up four times in a row during a series of coin flips. However, if a fair coin is flipped 20 times, there is about a 50 percent chance of getting four heads in a row. Ask yourself, if you flip four heads in a row, do you think you have a "hot hand" at coin flipping?

Mutual fund investing is one area where investors seem to fall prey to the clustering illusion. Every year, funds that have had exceptionally good performance receive large inflows of investor money. Despite the universal disclaimer that "past performance is no guarantee of future results," investors nonetheless clearly chase past returns.

The Gambler's Fallacy

People commit the gambler's fallacy when they assume that a departure from what occurs on average, or in the long run, will be corrected in the short run. Another way to think about the gambler's fallacy is that because an event has not happened recently, it has become "overdue" and is more likely to occur. People sometimes refer (wrongly) to the "law of averages" in such cases.

Roulette is a random gambling game where gamblers can make various bets on the spin of the wheel. There are 38 numbers on a roulette table; two green ones, 18 red ones, and 18 black ones. One possible bet is to bet whether the spin will result in a red number or in a black number. Suppose a red number has appeared five times in a row. Gamblers will often become confident that the next spin will be black, when the true chance remains at about 50 percent (of course, it is exactly 18 in 38).

The misconception arises from the human intuition that the overall odds of the wheel must be reflected in a small number of spins. That is, gamblers often become convinced that the wheel is "due" to hit a black number after a series of red numbers. Gamblers do know that the odds of a black number appearing are always unchanged: 18 in 38. But gamblers cannot help but feel that after a long series of red numbers, a black one must appear to restore the "balance" between red and black numbers over time. Thousands of betting systems exist that claim to be able to generate money by betting opposite to recent outcomes. One simple example in roulette is to wait until four red numbers in a row appear—then bet on black. Internet hucksters sell "guaranteed" betting systems that are basically based on the gambler's fallacy. None of them work. Think about it. If these betting systems actually worked, why would they be for sale?

Of course, there are many other related investor errors and biases. Here is a partial list:

- **Law of small numbers**: If you believe in the law of small numbers, you believe that a small sample of outcomes always resembles the long-run distribution of outcomes. If your investment guru has been right five out of seven times recently, you might believe that his long-run average of being correct is also five out of seven. The law of small numbers is related to recency bias and to the gambler's fallacy.

- **Recency bias**: Humans tend to give recent events more importance than less recent events. For example, during the great bull market that occurred from 1995 to 1999, many investors thought the market would continue its big gains for a long time—forgetting that bear markets also occur (which happened from 2000 to 2002). Recency bias is related to the law of small numbers.

- **Self-attribution bias**: This bias occurs when you attribute good outcomes to your own skill, but blame bad outcomes on luck.

- **Wishful thinking bias**: You suffer from wishful thinking bias when you believe what you want to believe. Wishful thinking bias relates to self-attribution bias.

- **False consensus**: This is the tendency to think that other people are thinking the same thing about a stock we own (or are going to buy). False consensus relates to overconfidence and loss aversion.

- **Availability bias**: You suffer from availability bias when you put too much weight on information that is easily available and place too little weight on information that is hard to attain. Your financial decisions will suffer if you consider only information that is easy to obtain.

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9.4a What is the representativeness heuristic?

9.4b What is the hot-hand fallacy? How could it affect investor decisions?

9.4c What is the gambler's fallacy? How could it affect investor decisions?

Others' Bad Behaviour Can Be Good for You

Behavioural finance is clearly working its way from academia into the nitty-gritty business of running mutual-fund portfolios.

Lewis Sanders, chief executive of Alliance Capital Management, held forth on the subject at Morningstar's annual investment conference in June, and JP Morgan Asset Management has launched a stable of funds whose investment framework exploits the concept. Basically, behavioural finance looks at why investors make bad, irrational decisions—whether it's holding on to losing stocks for too long or selling-winners too early. These poor decisions create market inefficiencies that savvy investors can capitalize on.

"Chasing strong investment performance, whether through asset classes or investment managers, seems to be a permanent feature of investor decision-making," Sanders pointed out. He walked the audience through a number of blind spots, one being that investors tend to focus disproportionately on the part of their portfolio that's not performing well.

Sanders concluded that investors "systematically buy high and sell low"—adding that in most cases, they are unaware of their biases. There's no doubt that irrational investment decisions are common, but does behavioural finance form the underpinning of a worthy portfolio management style?

There are some skeptics. "I'm not personally aware of any models that would allow analysts to scientifically or precisely choose their entry points based on behavioural finance," says Don Cassidy, senior research analyst at Lipper, who is a student of the discipline. What's more, many money-management shops already watch for behavioural-finance moves. Value investing, for example, holds that the market can become too pessimistic about certain stocks, creating buying opportunities.

JPMorgan Asset Management, which is trying to raise its profile as a fund manager, insists that behavioural finance is a sound investment framework, having launched four of its Intrepid funds in February 2003. It has run similar portfolios in Europe for about a decade.

Silvio Tarca, who heads the U.S. behavioural-finance team at JPMorgan Asset Management, says the funds look for "securities that have been mispriced by irrational investor behaviour. We're looking for securities with attractive valuations and improving earnings expectations where the investment sentiment has turned favourable."

Intrepid managers focus on three behavioural patterns:

- Investors are too optimistic about past winners and too pessimistic about past losers.
- Analysts tend to underreact to earnings information when they revise their forecasts, thereby underestimating a stock's intrinsic worth.
- Investors tend to hold recent losing stocks for too long and sell their winners too quickly.

The combination of value and momentum investing should balance each other. Emphasizing valuation provides some downside protection, notes Morningstar's Dan McNeela.

Tarca acknowledges that there are other portfolio managers incorporating behavioural-finance tenets into their strategies. But many managers "spend a good deal of their time meeting with company management and sell-side analysts trying to make qualitative assessments about a company's business prospects, as opposed to [our] more quantitative approach," he says.

The JPMorgan Intrepid Mid Cap (PECAX), previously under the BancOne fund stable until it was acquired, came into the fold late last year. So far this year the portfolio has gained 14.51%, placing it in the top 5% of Morningstar's mid-cap blend category. The other funds are off to a good start, for the most part. Intrepid Value Fund (JPIVX) gained 17.5% last year, besting 90% of its Morningstar peers. Intrepid Contrarian Fund (JIISX) was up 16% last year, landing it in the bottom half of its group. Intrepid Growth Fund (JPGSX) gained 10.50% last year, surpassing 74% of its peers. Intrepid American Fund (JPIAX) notched a 12.7% gain, placing it in the top 17% of its group. Intrepid European (VEUAX), launched in 2000, has a five-year return of 7.77%, ranking it in the top 27% of its group.

Other firms have tried to incorporate behavioural finance. Take AllianceBernstein Wealth Appreciation Strategies (AWAAX), which automatically rebalances the portfolio if it strays five percentage points from the targeted 50-50 split between growth and value stocks.

"We're really trimming from the outperforming asset class and buying the underperforming asset class, which is exactly the thing people can't do by themselves," says Tom Fontaine, senior portfolio manager at Alliance-Bernstein Investment Research and Management.

Source: Lawrence C. Strauss, *Barron's Online*, September 19, 2005.

9.5   Sentiment-Based Risk and Limits to Arbitrage

It is important to realize that the efficient markets hypothesis does not require every investor to be rational. As we have noted, all that is required for a market to be efficient is that at least some investors are smart and well-financed. These investors are prepared to buy and sell to take advantage of any mispricing in the marketplace. This activity is what keeps markets efficient. Sometimes, however, a problem arises in this context.

Limits to Arbitrage

limits to arbitrage
The notion that the price of an asset may not equal its correct value because of barriers to arbitrage.

The term **limits to arbitrage** refers to the notion that under certain circumstances, rational, well-capitalized traders may not be able to correct a mispricing, at least not quickly. The reason is that strategies designed to eliminate mispricings are often risky, costly, or somehow restricted. Three important impediments are:

- *Firm-specific risk*: This issue is the most obvious risk facing a would-be arbitrageur. Suppose that you believe that observed price on General Motors stock is too low, so you purchase many, many shares. Then, some unanticipated negative news drives the price of General Motors stock even lower. Of course, you could try to hedge some firm-specific risk by shorting shares in another stock, say, Ford. But there is no guarantee that the price of Ford will fall if some firm-specific event triggers a decline in the price of General Motors. It might even rise, leaving you even worse off. Furthermore, in many, if not most, cases there might not even be a stock that could be considered a close substitute.

noise trader A trader whose trades are not based on information or meaningful financial analysis.

- *Noise trader risk*: A **noise trader** is someone whose trades are not based on information or financially meaningful analysis. Noise traders could, in principle, act together to worsen a mispricing in the short run. Noise trader risk is important because the worsening of a mispricing could force the arbitrageur to liquidate early and sustain steep losses. As Keynes once famously observed, "Markets can remain irrational longer than you can remain solvent."[2] Noise trader risk is also called **sentiment-based risk**, meaning the risk that an asset's price is being influenced by sentiment (or irrational belief) rather than fact-based financial analysis. If sentiment-based risk exists, then it is another source of risk beyond the systematic and unsystematic risks we discussed in an earlier chapter.

sentiment-based risk
A source of risk to investors above and beyond firm-specific risk and overall market risk.

- *Implementation costs*: These costs include transaction costs such as bid-ask spreads, brokerage commissions, and margin interest. In addition, there might be some short-sale constraints. One short-sale constraint arises when there are not enough shares of the security to borrow so that the arbitrageur can take a large short position. Another short-sale constraint stems from legal restrictions. Many money managers, especially pension fund and mutual fund managers, are not allowed to sell short.

When these or other risks and costs are present, a mispricing may persist because arbitrage is too risky or too costly. Collectively, these risks and costs create barriers or limits to arbitrage. How important these limits are is difficult to say, but we do know that mispricings occur, at least on occasion. To illustrate, we next consider two well-known examples.

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[2]This remark is generally attributed to Keynes, but whether he actually said it is not known.

The 3Com/Palm Mispricing

On March 2, 2000, a profitable provider of computer networking products and services, 3Com, sold 5 percent of one of its subsidiaries to the public via an initial public offering (IPO). At the time, the subsidiary was known as Palm (now it is known as palmOne).

3Com planned to distribute the remaining Palm shares to 3Com shareholders at a later date. Under the plan, if you owned 1 share of 3Com, you would receive 1.5 shares of Palm. So, after 3Com sold part of Palm via the IPO, investors could buy Palm shares directly, or they could buy them indirectly by purchasing shares of 3Com.

What makes this case interesting is what happened in the days that followed the Palm IPO. If you owned one 3Com share, you would be entitled, eventually, to 1.5 shares of Palm. Therefore, each 3Com share should be worth *at least* 1.5 times the value of each Palm share. We say "at least" because the other parts of 3Com were profitable. As a result, each 3Com share should have been worth much more than 1.5 times the value of one Palm share. But, as you might guess, things did not work out this way.

The day before the Palm IPO, shares in 3Com sold for $104.13. After the first day of trading, Palm closed at $95.06 per share. Multiplying $95.06 by 1.5 results in $142.59, which is the minimum value one would expect to pay for 3Com. But the day Palm closed at $95.06, 3Com shares closed at $81.81, more than $60 lower than the price implied by Palm. It gets stranger.

A 3Com price of $81.81 when Palm is selling for $95.06 implies that the market values the rest of 3Com's businesses (per share) at $81.81 − $142.59 = −$60.88. Given the number of 3Com shares outstanding at the time, this means the market placed a *negative* value of about −$22 billion for the rest of 3Com's businesses. Of course, a stock price cannot be negative. This means, then, that the price of Palm relative to 3Com was much too high.

To profit from this mispricing, investors would purchase shares of 3Com and short shares of Palm. In a well-functioning market, this action would force the prices into alignment quite quickly. What happened?

As you can see in Figure 9.2, the market valued 3Com and Palm shares in such a way that the non-Palm part of 3Com had a negative value for about two months, from March 2, 2000, until May 8, 2000. Even then, it took approval by the IRS for 3Com to proceed with the planned distribution of Palm shares before the non-Palm part of 3Com once again had a positive value.

The Royal Dutch/Shell Price Ratio

Another fairly well known example of a mispricing involves two large oil companies. In 1907, Royal Dutch of the Netherlands and Shell of the United Kingdom agreed to merge their business enterprises and pay dividends on a 60-40 basis. So, whenever the stock prices of Royal Dutch and Shell are not in a 60-40 ratio, there is a potential opportunity to make an arbitrage profit. If, for example, the ratio were 50-50, you would buy Royal Dutch, and short sell Shell.

Figure 9.3 plots the daily deviations from the 60-40 ratio of the Royal Dutch price to the Shell price. If the prices of Royal Dutch and Shell are in a 60-40 ratio, there is a zero percentage deviation. If the price of Royal Dutch is too high compared to the Shell price, there is a positive deviation. If the price of Royal Dutch is too low compared to the price of Shell, there is a negative deviation. As you can see in Figure 9.3, there have been large and persistent deviations from the 60-40 ratio. In fact, the ratio is seldom at 60-40 for most of the time from 1962 through 2004.

| **FIGURE 9.2** | **The Percentage Difference between 1 Share of 3Com and 1.5 Shares of Palm, March 2, 2000 to July 27, 2000** |

| **FIGURE 9.3** | **Royal Dutch and Shell 60–40 Price Ratio Deviations, 1962 to 2004** |
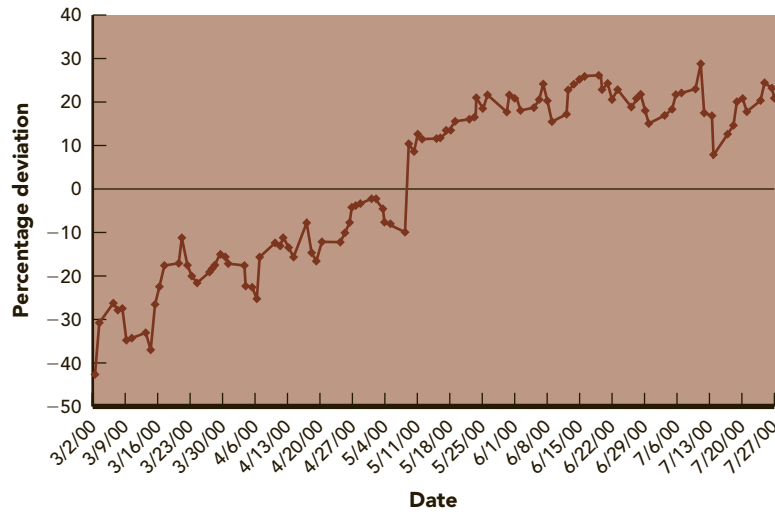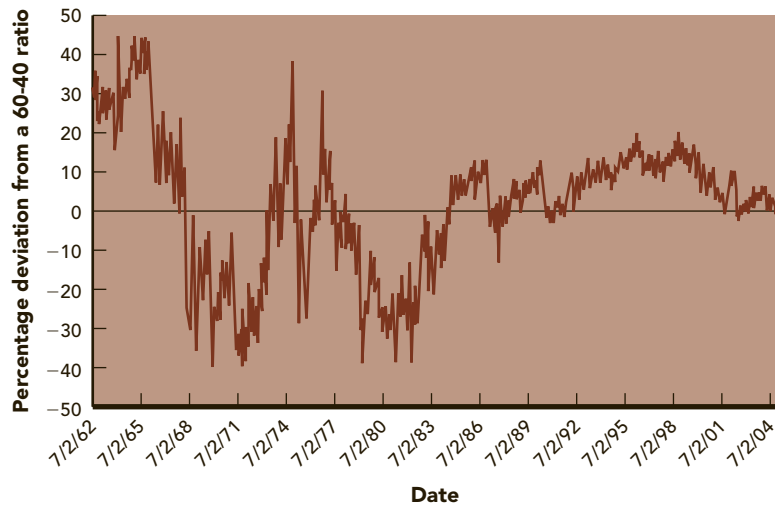
CHECK THIS ✓

9.5a   What does the term *limits to arbitrage* mean?

9.5b   If there were no limits to arbitrage, what would have been the relationship between 1 share of 3Com and 1.5 shares of Palm?

9.5c   If there were no limits to arbitrage, what would have been the relationship between the prices of Royal Dutch and Shell?

9.6 Technical Analysis

technical analysis
Using past price data and other nonfinancial data to identify future trading opportunities.

Many investors try to predict future stock price movements based on investor sentiment, errors in judgment, and/or historical price movements. These investors are using **technical analysis**. Unlike fundamental analysis, technical analysis does not rely on traditional valuation techniques like those presented in our earlier chapters.

Why Does Technical Analysis Continue to Thrive?

Proponents of the efficient markets hypothesis do not believe that technical analysis can assist investors in predicting future stock price movements. If that is the case, why is technical analysis still used? In fact, in this Internet and computer age, technical analysis is actually thriving. Why?

One possible reason that technical analysis still exists is that an investor can derive thousands of successful technical analysis systems by using historical security prices. Past movements of security prices are easy to fit into a wide variety of technical analysis systems. As a result, proponents of technical analysis can continuously tinker with their systems and find methods that fit historical prices. This process is known as "backtesting." Alas, successful investment is all about future prices.

Another possible reason that technical analysis still exists is simply that it sometimes works. Again, given a large number of possible technical analysis systems, it is possible that many of them will work (or appear to work) in the short run.

To give an example of a technical analysis tool, or a technical "indicator," consider trying to analyze market sentiment. The term "market sentiment" refers to the prevailing mood among investors about the future outlook of an individual security or the market. Market sentiment is generally classified as optimistic (bullish), neutral (undecided), or pessimistic (bearish).

Market sentiment usually takes time to change. That is, it takes time for, say, 80 percent of the investors to become bullish if only 50 percent of the investors are currently bullish. Investors who rely on market sentiment often believe that once 80 percent of the investors are bullish or bearish, a consensus has been reached. Further, once a consensus is reached, investors take this as a sign of an impending turn in the direction of the market. One way to measure market sentiment is to ask investors whether they think the market is going up or down. Suppose you ask 50 investors whether they are "bullish" or "bearish" on the market over the next month. Twenty say that they are bearish. The market sentiment index (MSI) can then be calculated as:

$$MSI = \frac{\text{Number of bearish investors}}{\text{Number of bullish investors} + \text{Number of bearish investors}}$$

$$MSI = \frac{20}{30 + 20} = 0.40$$

The MSI has a maximum value of 1.00, which occurs when every investor you ask is bearish on the market. The MSI has a minimum value of 0.00, which occurs when every investor you ask is bullish on the market. Note that if you are constructing a sentiment index, you will have to decide how many investors to ask, the identity of these investors, and their investment time frame, that is, daily, weekly, monthly, quarterly, or longer. You can construct a sentiment index for any financial asset for any investment time interval you choose.

People who calculate and use sentiment indexes often view them as "contrarian indicators." This means that if most other investors are bearish, perhaps the market is "oversold" and prices are due to rebound. Or if most other investors are bullish, perhaps the market is "overbought" and prices will be heading down.

The following saying is useful when you are trying to remember how to interpret the MSI: "When the MSI is high, it is time to buy; when the MSI is low, it is time to go." Note that there is no theory to guide investors as to what level of the MSI is "high" and what level is "low." This lack of precise guidance is a common problem with a technical indicator like the MSI.

Technical analysis techniques are centuries old, and their number is enormous. Many, many books on the subject have been written. For this reason, we only touch on the subject and introduce some of its key ideas in the next few sections. Although we focus on the use of technical analysis in the stock market, you should be aware that it is very widely used in commodity markets, and most comments herein apply to those markets as well.

Recall that investors with a positive outlook on the market are often called "bulls," and their outlook is characterized as "bullish." A rising market is called a "bull market." In contrast, pessimistic investors are called "bears," and their dismal outlook is characterized as "bearish." A falling market is called a "bear market." Technical analysts essentially search for bullish or bearish signals, meaning positive or negative indicators about stock prices or market direction.

Dow Theory

Dow theory
A method for predicting market direction that relies on the Dow Industrial and the Dow Transportation averages.

Dow theory is a method of analyzing and interpreting stock market movements that dates back to the turn of the twentieth century. The theory is named after Charles Dow, a cofounder of the Dow Jones Company and an editor of the Dow Jones–owned newspaper, *The Wall Street Journal.*

The essence of Dow theory is that there are, at all times, three forces at work in the stock market: (1) a primary direction or trend, (2) a secondary reaction or trend, and (3) daily fluctuations. According to the theory, the primary direction is either bullish (up) or bearish (down), and it reflects the long-run direction of the market.

However, the market can, for limited periods of time, depart from its primary direction. These departures are called secondary reactions or trends and may last for several weeks or months. These are eliminated by *corrections,* which are reversions to the primary direction. Daily fluctuations are essentially noise and are of no real importance.

The basic purpose of the Dow theory is to signal changes in the primary direction. To do this, two stock market averages, the Dow Jones Industrial Average (DJIA) and the Dow Jones Transportation Average (DJTA), are monitored. If one of these departs from the primary trend, the movement is viewed as secondary. However, if a departure in one is followed by a departure in the other, then this is viewed as a *confirmation* that the primary trend has changed. The Dow theory was, at one time, very well known and widely followed. It is less popular today, but its basic principles underlie more contemporary approaches to technical analysis.

Elliott Waves

Elliott wave theory
A method for predicting market direction that relies on a series of past market price swings (i.e., waves).

In the early 1930s, an accountant named Ralph Nelson Elliott developed the **Elliott wave theory**. While recuperating from life-threatening anemia (as well as his disastrous losses in the Crash of October 1929), Elliott read a book on Dow theory and began to study patterns of market price movements. Elliott discovered what he believed to be a persistent and recurring pattern that operated between market tops

Basic Elliott Wave Pattern

Learn more about the Elliott-wave at www.elliottwave.com
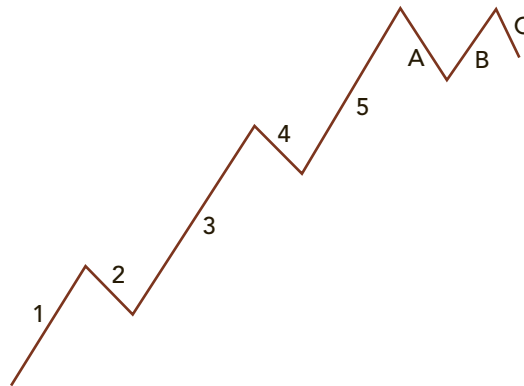
and bottoms. His theory was that these patterns, which he called "waves," collectively expressed investor sentiment. Through use of sophisticated measurements that he called "wave counting," a wave theorist could forecast market turns with a high degree of accuracy.

In 1935, Elliott published his theory in his book called *The Wave Principle.* His main theory was that there was a repeating eight-wave sequence. The first five waves, which he called "impulsive," were followed by a three-wave "corrective" sequence. Figure 9.4 shows the basic Elliott wave pattern. The impulse waves are labelled numerically, 1 through 5, while the corrective waves are labelled A, B, and C.

The basic Elliott wave theory gets very complicated because, under the theory, each wave can subdivide into finer wave patterns that are classified into a multitude of structures. Notwithstanding the complex nature of the Elliott wave theory, it is still a widely followed indicator.

Support and Resistance Levels

support level
Price or level below which a stock or the market as a whole is unlikely to fall.

resistance level
Price or level above which a stock or the market as a whole is unlikely to rise.

A key concept in technical analysis is the identification of support and resistance levels. A **support level** is a price or level below which a stock or the market as a whole is unlikely to fall. A **resistance level** is a price or level above which a stock or the market as a whole is unlikely to rise.

The idea behind these levels is straightforward. As a stock's price (or the market as a whole) falls, it reaches a point where investors increasingly believe that it can fall no further—the point at which it "bottoms out." Essentially, purchases by bargain-hungry investors ("bottom feeders") pick up at that point, thereby "supporting" the price. A resistance level is formed by reverse logic. As a stock's price (or the market as a whole) rises, it reaches a point where investors increasingly believe that it can go no higher— the point at which it "tops out." Once it does, sales by profit-hungry investors ("profit takers") pick up, thereby "resisting" further advances.

Resistance and support areas are usually viewed as psychological barriers. As the DJIA approaches levels with three zeros, such as 11,000, increased talk of "psychologically im- portant" prices appears in the financial press. A "breakout" occurs when a stock (or the market as a whole) closes below a support level or above a resistance level. A breakout is usually interpreted to mean that the price move will continue in that direction.

As this discussion illustrates, much colourful language is used under the heading of technical analysis. We will see many more examples just ahead.

Technical Indicators

Technical analysts rely on a variety of technical indicators to forecast the direction of the market. Every day, The *Globe and Mail* publishes a variety of such indicators. An excerpt of the "Market Breadth" section appears in Figure 9.5.

Much, but not all, of the information presented is self-explanatory. We see the number of price advances, the number of price declines, and the number of unchanged prices. The number of stock prices reaching new highs and new lows as of that day is also listed. Figure 9.6 shows the Market Health section of the September 15, 2007, *Globe and Mail*. You can find the bull–bear ratio, the insider line, and the bullish percent index line. Each graph is followed by an explanation of how to interpret the figures.

One popular technical indicator is called the *advance/decline line*. This indicator shows, for some given period, the cumulative difference between advancing issues and declining issues. For example, Table 9.3 contains advance and decline information for the August 1, 2005, to August 5, 2005, trading week.

In Table 9.3, notice how we take the difference between the number of issues advancing and declining on each day and then cumulate the difference through time. For example, on Monday, 302 more issues advanced than declined. On Tuesday, 1,125 more issues advanced than declined. Over the two days, the cumulative advance/decline is thus $302 + 1,125 = 1,427$.

This cumulative advance/decline number, once plotted, is the advance/decline line. A downward-sloping advance/decline line would be considered a bearish signal, whereas an upward-sloping advance/decline line is a bullish signal. The advance/decline line is often used to measure market "breadth." If the market is going up, for example, then technical analysts view it as a good sign if there is market breadth. That is, the signal is more bullish if the advance is accompanied by a steeply upwardly sloping advance/decline line.

"Closing Arms" is the ratio of average trading volume in declining issues to average trading volume in advancing issues. It is calculated as follows:

$$\text{Arms} = \frac{\text{Declining Volume/Declining Issue}}{\text{Advancing Volume/Advancing Issues}} \tag{9.1}$$

FIGURE 9.5

Market Breadth

MARKET BREADTH

% change indicates increase/decrease from 13-week average

	TSX	Venture	NYSE	Nasdaq
Advance	686	572	1,836	1,629
% Chg	-9.01	13.76	10.66	12.71
Adv. Vol (000s)	113,910	239,571	1,549,001	818,012
Decline	822	550	1,496	1,312
% Chg	6.44	-1.43	-5.37	-13.03
Decl. Vol (000s)	166,094	69,041	1,158,210	748,963
Unchanged	730	1,229	270	351
% Chg	22.81	.75	-12.10	13.71
Unch. Vol (000s)	34,009	20,908	17,078	30,803
Total	2,238	2,351	3,602	3.292
New High	9	18	62	50
% Chg	-81.91	-44.73	-61.82	-48.50
New Low	32	36	79	96
% Chg	6.93	57.84	22.82	39.37
Vol (000s)	314,014	329,519	2,724,289	1,597,777
% Chg	-9.37	99.31	-2.15	-20.99

FIGURE 9.6

Globe and Mail

MARKET HEALTH » WHAT THE MARKET IS TELLING US

FEAR FACTOR

MONTREAL IMPLIED VOLATILITY INDEX — S&P/TSX

VOLATILITY IS RISING

The Montréal Exchange's MVX reflects the market's expectation of how volatile the overall stock market in Canada will be over the next month. Volatility can signify turmoil, therefore the MVX measures investor fear, which rises when the volatility rises. The MVX is derived from option prices on the S&P/TSX 60 ETF.

INSIDE LINE

INK BUY-SELL RATIO — S&P/TSX

INK INSIDER TRADING SENTIMENT IS BULLISH

A high ratio of insider buyers to sellers is bullish, signalling executives believe the TSX is going to rise. A low ratio is bearish. The ratio is calculated by dividing TSX-listed companies with insider buy-only transactions by ones with sell-only transactions. Source: Market INK Report by www.inkresearch.ca.

COUNTING BULLS AND BEARS

BULL BEAR RATIO — S&P/TSX

TSX TREND METER IS BEARISH

A reading above 1.0 shows there are more stocks with a bullish price trend than with a bearish trend. Stocks with a bullish trend have a 13-week moving average (MA) above their 40-week MA, while bearish stocks have a 13-week MA below their 40-week MA. Source: www.stocktrends.ca

BUYING AND SELLING POINTS

BULLISH PERCENT INDEX — S&P/TSX

BULLISH PERCENT INDEX IS BULLISH

A reading above 67% indicates Canadian stocks could be headed for a fall. A reading near 40% often indicates a market bottom. The index is calculated by dividing the number of stocks with buy signals using point and figure technical analysis by stocks with sell signals. Source: www.stockcharts.com

Courtesy of StockCharts.com, Inc.

TABLE 9.3	Advance/Decline Line Calculation			
Weekday	**Issues Advancing**	**Issues Declining**	**Difference**	**Cumulative Difference**
Monday	1,777	1,475	+302	+302
Tuesday	2,192	1,067	+1,125	1,427
Wednesday	1,546	1,724	−178	1,249
Thursday	1,079	2,207	−1,128	+121
Friday	738	2,532	−1,794	−1,673

The ratio is named after its inventor, Richard Arms; it is often called the "trin," which is an acronym for "tr(ading) in(dex)." Notice that the numerator in this ratio is just the average volume for issues that declined on that day. The denominator is the average volume for advancing issues. Values greater than 1.00 are considered bearish because the indication is that declining shares had heavier volume. Using the number from Figure 9.5 we can calculate the Arms value as follows:

$$\text{Arms} = \frac{166,094/822}{113,910/686} = 1.215$$

A caveat: Some sources reverse the numerator and the denominator when they calculate this ratio.

Relative Strength Charts

relative strength
A measure of the performance of one investment relative to another.

Relative strength charts illustrate the performance of one company, industry, or market relative to another. If you look back at the *Value Line* exhibit in Chapter 7, you will see a plot labelled "relative strength." Very commonly, such plots are created to analyze how a stock has done relative to its industry or the market as a whole.

To illustrate how such plots are constructed, suppose that on some particular day, we invest equal amounts, say $100, in both Ford and GM (the amount does not matter; what matters is that the original investment is the same for both). On every subsequent day, we take the ratio of the value of our Ford investment to the value of our GM investment, and we plot it. A ratio bigger than 1.0 indicates that, on a relative basis, Ford has outperformed GM, and vice versa. Thus, a value of 1.20 indicates that Ford has done 20 percent better than GM over the period studied. Notice that if both stocks are down, a ratio bigger than 1.0 indicates that Ford is down by less than GM.

RELATIVE STRENGTH

EXAMPLE 9.1

Consider the following series of monthly stock prices for two hypothetical companies:

Month	Stock A	Stock B
1	$25	$50
2	24	48
3	22	45
4	22	40
5	20	39
6	19	38

On a relative basis, how has stock A done compared to stock B?

To answer, suppose we had purchased four shares of A and two shares of B for an investment of $100 in each. We can calculate the value of our investment in each month and then take the ratio of A to B as follows:

(continued)

Month	Investment Value		Relative Strength
	Stock A (4 shares)	Stock B (2 shares)	
1	$100	$100	1.00
2	96	96	1.00
3	88	90	0.98
4	88	80	1.10
5	80	78	1.03
6	76	76	1.00

What we see is that over the first four months both stocks were down, but A outperformed B by 10 percent. However, after six months the two had done equally well (or equally poorly).

Charting

Technical analysts rely heavily on charts showing recent market activity in terms of either prices or, less frequently, volume. In fact, technical analysis is sometimes called "charting," and technical analysts are often called "chartists." There are many types of charts, but the basic idea is that by studying charts of past market prices (or other information), the chartist identifies particular patterns that signal the direction of a stock or the market as a whole. We briefly describe some charting techniques next.

Open-High-Low-Close Charts (OHLC) Perhaps the most popular charting method is the bar chart. The most basic bar chart uses the stock's opening, high, low, and closing prices for the period covered by each bar. If the technician is constructing a daily bar chart, the technician will use the daily opening high, daily low, and daily closing prices of the stock. The high and low prices are represented by the top and bottom of the vertical bar and the opening and closing prices are shown by short horizontal lines crossing the vertical bar. The example of a bar chart in Figure 9.7 for RIM is from www.stockcharts.com.

Price Channel A price channel is a chart pattern using OHLC data that can slope upward, downward, or sideways. Price channels belong to the group of price patterns known as *continuation patterns*. A continuation pattern is a pattern where the price of the stock is expected to continue along its main direction. A price channel has two boundaries, an upper trendline and a lower trendline. The upper trendline marks resistance and the lower trendline marks support. If the overall price movement of the stock is downward, the upper trendline is called the main trendline, and the lower trendline is called the channel line. The example of a price channel for ChevronTexaco in Figure 9.8 is from the Web site www.stockcharts.com.

Head and Shoulders A head and shoulders chart pattern belongs to a group of price charts known as *reversal patterns*. Reversal pattern charts also use OHLC data. These chart patterns signal that a reversal from the main trendline is possibly going to occur. Because it belongs to the reversal pattern group, a head and shoulders pattern is identified as either a *head and shoulders top* or a *head and shoulders bottom*. The example of a head and shoulders top for CNET Networks in Figure 9.9 is also from the Web site www.stockcharts.com.

FIGURE 9.7   **Open-High-Low-Close Bar Chart for RIM**

Daily View

RIM.TO (Research in Motion Ltd.) TSE   ©StockCharts.com
14-Sep-2007   **Open** 89.99 **High** 90.60 **Low** 89.01 **Close** 89.99 **Volume** 1.9M **Chg** +1.45 (+1.64%) ▲
— PPO(12,26,9) 3.364, 3.566, −0.203

As you can see in Figure 9.9, the head and shoulders top formation has three components: the *left shoulder,* the *head,* and the *right shoulder.* To qualify as a head and shoulders top pattern, the shoulders must be lower than the head. Then, a *neckline support* is drawn between the valleys formed by the left and right shoulders. The reversal signal is generated when the neckline is *pierced.* In the case of CNET, once the stock price fell below $45, the stock plunged to $25. Of course, there are *false piercings,* which do not result in a sudden downdraft of the stock.

Moving Averages   Moving averages are used to generate price reversal signals. As the name implies, a moving average is simply the average closing price of a stock over

Chevron Texaco (CVX) NYSE   © StockCharts.com
10-Apr-2000 **Open** 80.91 **High** 82.80 **Low** 80.61 **Close** 81.50 **Volume** 1.3 **Chg** −0.36 (−0.43%)▾

CNET Networks, Inc. (CNET) Nasdaq Nat.Mkt   © StockCharts.com
9-Jun-2000 **Open** 34.62 **High** 35.00 **Low** 33.75 **Close** 34.50 **Volume** 610.5k **Chg** +0.75 (+2.22%)▴

a fixed length of time, say 20 days. Each day, the new closing price is added to the calculation, and the oldest closing price is dropped from the calculation.

Moving averages are either simple or exponential. In a *simple moving average,* all days are given equal weighting. In an *exponential moving average,* more weight is given to the most recently observed price. Market technicians, like many investors, often believe that the latest price observed for a stock is the most important piece of information about the stock. In Example 9.2, we present data for a three-day simple moving average and data for a three-day exponential moving average, where two-thirds of the average weight is placed on the most recent price.

THREE-DAY SIMPLE MOVING AVERAGE AND THREE-DAY EXPONENTIAL MOVING AVERAGE

EXAMPLE 9.2

Day	Closing Price	Three-Day Simple Moving Average	Three-Day Exponential Moving Average
1	$89.00		
2	88.44		$88.72
3	87.60	$88.35	87.97
4	86.20	87.41	86.79
5	85.75	86.52	86.10
6	84.57	85.51	85.08
7	83.64	84.65	84.12
8	76.70	81.64	79.17
9	76.65	79.00	77.49
10	75.48	76.28	76.15

To calculate the first three-day simple moving average, we need three closing prices. The first simple moving average entry is simply:

($89.00 + $88.44 + $87.60)/3 = $88.35

The second simple moving average entry is:

($88.44 + $87.60 + $86.20)/3 = $87.41

To calculate a three-day exponential moving average, we begin by averaging the first two days:

($89.00 + $88.44)/2 = $88.72

This is the first number that appears in the exponential moving average column. To obtain the next one, you must decide how much weight is placed on the latest price. As noted above, we selected a 2/3, or 0.667, weight. To calculate the next exponential moving average entry, we multiply the latest closing price by 0.667 and the previous exponential moving average entry by 0.333:

(0.667)($87.60) + (0.333)($88.72) = $87.97

The next exponential moving average entry is:

(0.667)($86.20) + (0.333)($87.97) = $86.79

You can see that the simple moving average and the exponential moving average generate different numbers. The exponential moving average responds more quickly to the latest price information than does the simple moving average.

For a description of many technical indicators, including other moving average indicators, see www.incredible-charts.com.

In practice, 50-day moving averages are frequently compared to 200-day moving averages. The 200-day moving average might be thought of as indicative of the long-run trend, while the 50-day average might be thought of as a short-run trend. If the 200-day average was rising while the 50-day average was falling, the indication might be that price declines are expected in the short term, but the long-term outlook is favourable. Alternatively, the indication might be that there is a danger of a change in the long-term trend. Our nearby *Work the Web* box gives an example.
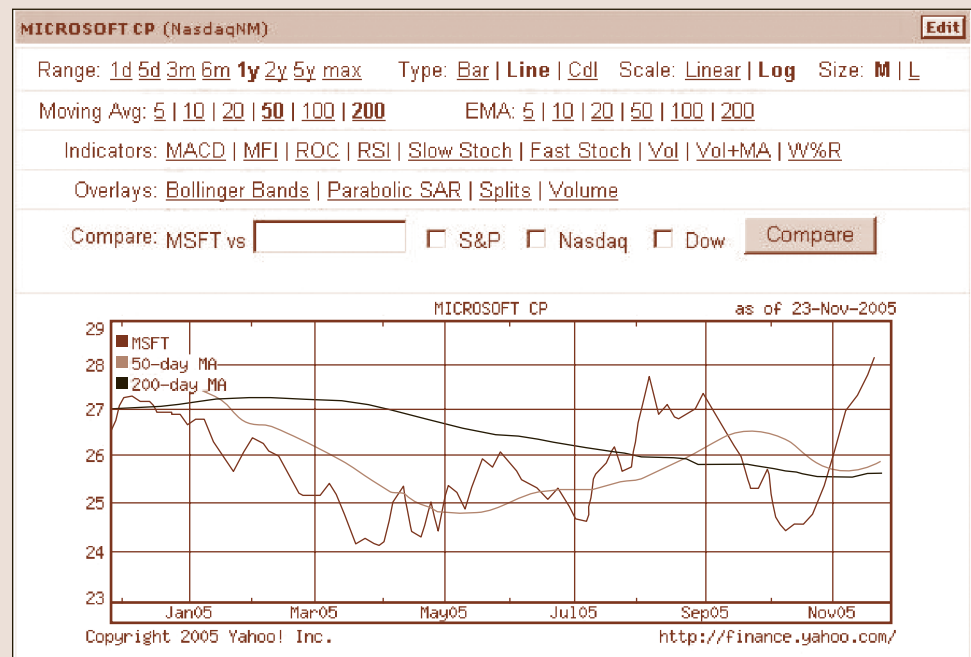
WORK THE WEB

Charts are easy to draw online. Two of the best sites are stockcharts.com and www. bigcharts.com. Here is an example from finance.yahoo.com:

As illustrated, we have drawn a moving average chart for Microsoft. The jagged line tracks Microsoft's daily stock price over the past year. The two smoother lines are the 50-day and 200-day moving averages. Notice the 50-day average crosses the 200-day average in August from below. Such a crossing is sometimes interpreted as a signal to buy. In this case, the signal was false in the short run because the stock subsequently fell in price. Despite the fall, the 50-day moving average remained above the 200-day moving average. Investors who stayed in have made a profit.

```
MICROSOFT CP (NasdaqNM)                                          [Edit]

Range: 1d 5d 3m 6m 1y 2y 5y max    Type: Bar | Line | Cdl   Scale: Linear | Log   Size: M | L

Moving Avg: 5 | 10 | 20 | 50 | 100 | 200        EMA: 5 | 10 | 20 | 50 | 100 | 200

   Indicators: MACD | MFI | ROC | RSI | Slow Stoch | Fast Stoch | Vol | Vol+MA | W%R

   Overlays: Bollinger Bands | Parabolic SAR | Splits | Volume

Compare: MSFT vs [            ]    □ S&P  □ Nasdaq  □ Dow   Compare
```


Putting it All Together Quite often, a market technician will be using multiple chart indicators to help in making trading decisions. Let's examine the collection of technical information available from the Web site www.bigcharts.com. We set the Web site controls to give us three months of daily data for General Motors (GM). In addition, we asked the Web site to provide us with 9-day and 18-day exponential moving averages, Bollinger bands, volume, *MACD*, and *money flow*. The results appear in Figure 9.10.

Bollinger Bands John Bollinger created Bollinger bands in the early 1980s. The purpose of Bollinger bands is to provide *relative* levels of high and low prices. Bollinger bands represent a 2-standard deviation bound calculated from the moving average (this is why Bollinger bands do not remain constant). In Figure 9.10, the Bollinger bands surround a 20-day moving average. The Bollinger bands are the maroon bands that appear in the top chart. Bollinger bands have been interpreted in many ways by their users. For example, when the stock price is relatively quiet, the Bollinger bands are tight, which indicates a possible pent-up tension that must be released by a subsequent price movement.

Technical Analysis Data for General Motors

GM Daily ▬   Bollinger Bands (20) ▬   EMA (9) ▬   EMA (18) ▬   11/23/05
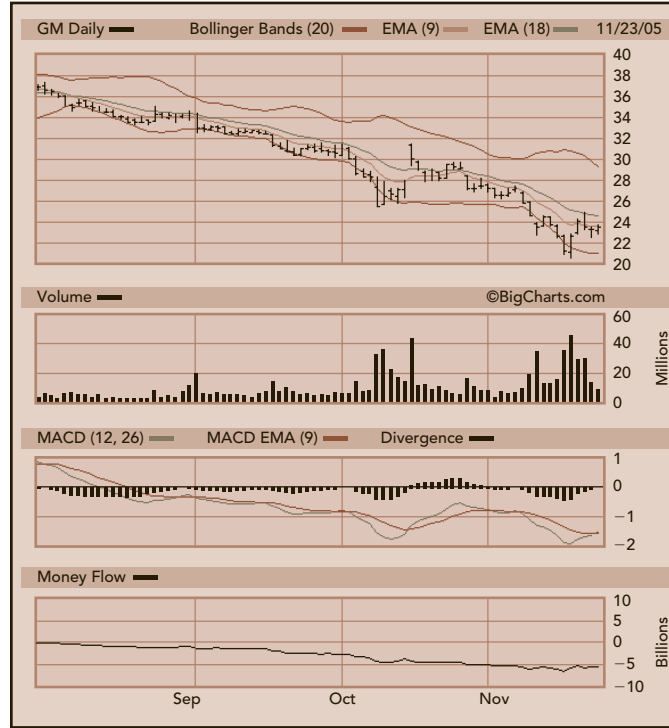
MACD   MACD stands for moving average convergence divergence. The MACD indicator shows the relationship between two moving averages of prices. The MACD is derived by dividing one moving average by another and then comparing this ratio to a third moving average, the signal line. In the GM example, the MACD uses a 12-day and a 26-day moving average and a 9-day signal line. The convergence/divergence of these three averages is represented by the solid black bars in the third chart of Figure 9.10. The basic MACD trading rule is to sell when the MACD falls below its signal line and to buy when the MACD rises above its signal line.

Money Flow   The idea behind money flow is to identify whether buyers are more eager to buy the stock than sellers are to sell it. In its purest form, money flow looks at each trade. To calculate the money flow indicator, the technician multiplies price and volume for the trades that occur at a price higher than the previous trade price.

CALCULATING MONEY FLOW

Price	Up (+); Down (−); Unchanged (0)	Volume	Price × Volume	Money Flow (+)	Money Flow (−)	Net Money Flow
10						
11	+	1,000	11,000	11,000		
12	+	100	1,200	12,200		
12	0	500	6,000			
11	−	500	5,500		5,500	
10	−	50	500		6,000	
At the end of the day:						6,200

The technician then sums this money flow. From this sum, the technician subtracts an-
other money flow: the accumulated total of price times volume for trades that occur at
prices lower than the previous trade. Example 9.3 shows how to calculate money flow.

Traders using money flow look for a divergence between money flow and price.
If price remains stable but money flow becomes highly positive, this is taken as an
indicator that the stock price will soon increase. Similarly, if the stock price remains
stable but the money flow becomes quite negative, this is taken as an indicator that the
stock price will soon decrease. In Figure 9.10, the negative accumulation of money
flow for GM signals to followers of money flow that further price declines for GM
are in order.

Fibonacci Numbers

Traders using technical analysis are interested in timing their purchase or sale of a stock.
As you know by now, these traders look for support or resistance stock price levels. As
strange as it may seem, one source that traders use is known as the *golden mean.* The
golden mean is sometimes abbreviated by the greek letter phi (ϕ). The golden mean, ϕ,
is approximately equal to 1.618 (it is precisely equal to $(\sqrt{5}+1)/2$). The golden mean
is mathematically interesting, because, among other things, $\phi^2 = \phi + 1$.

The golden mean also results from a series of numbers known as *Fibonacci
numbers.* The infinite Fibonacci series grows as follows:

$$1,1,2,3,5,8,13,21,34,55,89,144,233,377,610,987 \ldots$$

Note that the series begins with 1,1 and grows by adding the two previous numbers
together (for example, $21 + 34 = 55$). Let's look at the ratio of some number to their
predecessor in the series:

$$21/13 = 1.6154$$
$$34/21 = 1.6190$$
$$55/34 = 1.6176$$
$$89/55 = 1.6182$$

The ratio converges to 1.618, or ϕ. Market technicians are interested in ϕ because:

$$(\phi - 1) / \phi = 0.618 / 1.618 = 0.382$$
$$1 / \phi = 1.000 / 1.618 = 0.618 = \phi - 1$$

Market technicians use these numbers to predict support and resistance levels.
For example, as a stock increases in value over time, it will occasionally pull back
in value. Suppose a stock has increased from $40 to $60, and has recently begun
to fall a bit in value. Using the $(\phi - 1) / \phi$ ratio, market technicians would predict
the primary support area would occur at $52.36 ($60 − $40 = $20; $20 × 0.382
= $7.64; $60 − $7.64 = $52.36). A similar calculation that uses the $1 / \phi$ ratio of
0.618 instead of 0.382 results in the secondary support area of $47.64. If the stock
were to pierce this secondary support level and close below it, the rally would be
declared over. Market technicians would then begin to look for opportunities to sell
the stock short if it subsequently rallied.

Nature provides many instances involving Fibonacci numbers. The number of petals
on a flower is often a Fibonacci number. For example, black-eyed susans have 13 petals
and ordinary daisies have 34. Also, pinecones and pineapples have spirals containing 8
or 13 scales. There are so many other examples that some observers classify Fibonacci
numbers as a "law of nature." Because of this, some market technicians believe that the
Fibonacci numbers should also apply to market prices.

Other Technical Indicators

We close our discussion of technical analysis by describing a few additional technical indicators. The "odd-lot" indicator looks at whether odd-lot purchases (purchases of fewer than 100 shares) are up or down. One argument is that odd-lot purchases represent the activities of smaller, unsophisticated investors, so when they start buying, it's time to sell. This is a good example of a "contrarian" indicator. In contrast, some argue that because short selling is a fairly sophisticated tactic, increases in short selling are a negative signal.

Some indicators can seem a little silly. For example, there is the "hemline" indicator, which is also known as the "bull markets and bare knees" indicator. Through much of the nineteenth century, long skirts dominated women's fashion and the stock market experienced many bear markets. In the 1920s, flappers revealed their knees and the stock market boomed. Even the stock market crash of October 1987 was predicted by hemlines. During the 1980s, miniskirts flourished, but by October 1987, a fashion shift had women wearing longer skirts.

One of the more famous (or fatuous, depending on how you look at it) indicators is the Super Bowl indicator, which forecasts the direction of the market based on whether the National Football Conference or the American Football Conference wins. A Super Bowl win by a National Football Conference team or an American Football Conference team that used to be in the old National Football League (e.g., Pittsburgh Steelers, Baltimore Colts) is bullish. This probably strikes you as absurd, so you might be surprised to learn that for the period 1967–1988, the Super Bowl indicator forecast the direction of the stock market with more than 90 percent accuracy. A nearby *Investment Updates* box contains more details about this indicator.

CHECK THIS ✓

9.6a   What is technical analysis?

9.6b   What is the purpose of charting a stock's past price?

9.6c   What is the purpose of using technical indicators?

There are lots of other technical trading rules. How seriously should you take them? That's up to you, but our advice is to keep in mind that life is full of odd coincidences. Just because a bizarre stock market predictor seems to have worked well in the past doesn't mean that it's going to work in the future.

9.7   Summary and Conclusions

In this chapter, we examined behavioural finance and technical analysis. We learned that a key to becoming a wise investor is to avoid certain types of behaviour. By studying behavioural finance, you can see the potential damage to your (or your client's) portfolio from overconfidence and psychologically induced errors.

The evidence is relatively clear on one point: Investors probably make mistakes. A much more difficult question, and one where the evidence is not at all clear, is whether risks stemming from errors in judgment by investors can influence market prices and lead to market inefficiencies. Market efficiency does not require that all investors behave in a rational fashion. It just requires that some do.

Every January, about 90 million people in the United States watch television for a prediction of how well the stock market is going to do in the upcoming year. So you missed it this year? Maybe not. The stock market predictor we are talking about is the Super Bowl!

The Super Bowl indicator has become one of the more famous (or infamous) technical indicators of stock market performance. Here's how it works. In the 1960s, the original National Football League (NFL) and the upstart American Football League (AFL) were fighting for dominance. The Super Bowl indicator says that if a team from the original AFL wins the Super Bowl, the market posts a negative return for the year, and if a team from the original NFL wins, the market will post a gain for the year.

So how has the Super Bowl predictor performed? Take a look at the chart we obtained from www.cnn.com.

For the first 31 Super Bowls, the indicator was correct 28 out of 31 times! The Miami Dolphins are perhaps the best market predictor. When Miami won the Super Bowl in 1973, the market proceeded to drop by 14.7 percent. The next year was an even better indicator. The next year, the Dolphins beat the Minnesota Vikings and the S&P 500 lost 26.5 percent, the worst one-year performance in its history. When the Dolphins lost the Super Bowl in 1972, 1983, and 1985, the S&P 500 posted double-digit gains in each of those years.

So you are not ready to bet the ranch on the Super Bowl indicator? It's probably a good thing. Since 1997, the Super Bowl indicator has been right only twice, in 2002 and 2005. The New England Patriots, an AFL team, won the Super Bowl in both of these years and the S&P 500 dropped 30 percent in 2002 (but only 0.6 percent in 2005). The performance in 2001 is not as clear. The Baltimore Ravens won the Super Bowl that year and the market lost 7.6 percent. The Ravens are the descendants of the original Cleveland Browns, a member of the original NFL. In this case, the Super Bowl indicator was incorrect. However, purists (especially in Cleveland) argue that

The Predictor (30-7-2)	
Bullish years (22)	
49ers - '82, '85, '89, '95	
Bears- '86	
Colts - '71	
Cowboys - '72, '93, '94, '96	
Giants - '87, '91	
Packers, '67, '68, '97	
Redskins - '83, '88, '92	
Steelers - '75, '76, '79, '80	
Bearish years (8)	
Dolphins - '73, '74	
Jets, '69	
Patriots, '02, '05	
Raiders - '77, '81, '84	
Indicator missed (7)	
Broncos - '98, '99	
Chiefs - '70	
49ers - '90	
Cowboys - '78	
Rams -'00	
Patriots - '04	
Inconclusive (2)	
Ravens - '01*	
Buccaneers - '03**	

*Created when the old NFL Cleveland Browns moved to Baltimore, the NFL says the Ravens started life as an AFC team in 1996, which would mean the predictor was accurate.
**Expansion team

since the Browns have been revived, the Ravens cannot be considered a member of the original NFL. But the Ravens did beat the New York Giants, an old NFL team. In 2003, the expansion Tampa Bay Buccaneers beat an original AFL team, the Oakland Raiders, and the market went up about 28 percent.

Nonetheless, many investors try to predict future stock price movements based on investor sentiment, errors in judgment, or historical price movements. Such investors rely on the tools of technical analysis, and we present numerous specific methods used by technical analysts. Whether these tools or methods work is much debated. We close this chapter by noting that it is possible that market prices are influenced by factors like errors in judgment by investors, sentiment, emotion, and irrationality. If they are, however, we are unaware of any scientifically proven method investors such as you can use to profit from these influences.

REAL WORLD

This chapter deals with various aspects of behavioural finance. How do you go about incorporating these concepts into the management of your portfolio? First, recall that one of the major lessons from this chapter is that, at times, you may be your own worst enemy when you are investing.

But suppose that you are able to harness your own psychological flaws that unduly influence your investment decisions. To profit from insights from behavioural finance, you might try to shift your portfolio to take advantage of situations where you perceive other market participants have incorrectly valued certain stocks, bonds, derivatives, market sectors, or even countries. Shifting portfolio weights to take advantage of these opportunities is called a "dynamic" trading strategy.

Here is one example of using a dynamic trading strategy. Consider a typical value/growth portfolio weight-shifting scheme. When there is a great deal of market overreaction, perhaps signalled by high market volatility, you would increase, or tilt, your relative portfolio weight toward value stocks. When there is a great deal of market underreaction, perhaps signalled by low market volatility, you would increase your relative weighting in growth stocks. The problem, of course, is knowing when and how to tilt your portfolio to take advantage of what you perceive to be market overreactions and underreactions. At times, you can do very well when you tilt your portfolio. Other times, to use an old commodity market saying, "you get your head handed to you."

There is a great amount of information available on the Internet about behavioural finance and building portfolios. One interesting place to start is the research section at www.psychonomics.com. Make sure that the money that you are using to test any trading scheme is only a small portion of your investment portfolio.

Key Terms

behavioural finance 273	**sentiment-based risk** 284
prospect theory 273	**technical analysis** 287
mental accounting 275	**Dow theory** 288
loss aversion 275	**Elliott wave theory** 288
representativeness heuristic 279	**support level** 289
clustering illusion 281	**resistance level** 289
limits to arbitrage 284	**relative strength** 292
noise trader 284	

Chapter Review Problems and Self-Test

1. **It's All Relative** Consider the following series of monthly stock prices for two companies:

Week	Phat Co	GRRL Power
1	$10	$80
2	12	82
3	16	80
4	15	84
5	14	85
6	12	88

On a relative basis, how has Phat done compared to GRRL Power?

2. **Simple Moving Averages** Using the prices from the previous problem, calculate the three-month simple moving average prices for both companies.

Answers to Self-Test Problems

1. Suppose we had purchased eight shares of Phat and one share of GRRL Power. We can calculate the value of our investment in each month and then take the ratio of Phat to GRRL Power as follows:

Week	Investment Value		Relative Strength
	Phat Co (8 shares)	GRRL Power (1 share)	
1	$80	$80	1.00
2	96	82	1.17
3	128	80	1.60
4	120	84	1.43
5	112	85	1.32
6	96	88	1.09

Phat Co. has significantly outperformed GRRL Power over much of this period; however, after six weeks, the margin has fallen to about 9 percent from as high as 60 percent.

2. The moving averages must be calculated relative to the share price; also note that results cannot be computed for the first two weeks because of insufficient data.

Week	Phat Co	Phat Co. Moving Average	GRRL Power	GRRL Power Moving Average
1	$10	—	$80	—
2	12	—	82	—
3	16	$12.67	80	$80.67
4	15	14.33	84	82.00
5	14	15.00	85	83.00
6	12	13.67	88	85.67

Test Your Investment Quotient ⎡Q⎤

1. **Technical Analysis** Which of the following is a basic assumption of technical analysis in contrast to fundamental analysis?
   a. Financial statements provide information crucial in valuing a stock.
   b. A stock's market price will approach its intrinsic value over time.
   c. Aggregate supply and demand for goods and services are key determinants of stock value.
   d. Security prices move in patterns, which repeat over long periods.

2. **Technical Analysis** Which of the following is least likely to be of interest to a technical analyst?
   a. A 15-day moving average of trading volume.
   b. A relative strength analysis of stock price momentum.
   c. Company earnings and cash flow growth.
   d. A daily history of the ratio of advancing issues over declining issues.

3. **Dow Theory** Dow theory asserts that three forces are at work in the stock market at any time. Which of the following is not one of these Dow theory forces?
   a. Daily price fluctuations
   b. A secondary reaction or trend
   c. A primary direction or trend
   d. Reversals or overreactions

4. **Technical Indicators** The advance/decline line is typically used to

   a. Measure psychological barriers.
   b. Measure market breadth.
   c. Assess bull market sentiment.
   d. Assess bear market sentiment.

5. **Technical Indicators** The Closing Arms (trin) ratio is the ratio of

   a. Average trading volume in declining issues to advancing issues.
   b. Average trading volume in NYSE issues to NASDAQ issues.
   c. The number of advancing issues to the number of declining issues.
   d. The number of declining issues to the number of advancing issues.

6. **Technical Indicators** Resistance and support areas for a stock market index are viewed as technical indicators of

   a. Economic barriers
   b. Psychological barriers
   c. Circuit breakers
   d. Holding patterns

7. **Technical Analysis** Which of the following are used by technical analysts?

   I. Historical prices
   II. Financial statements
   III. Historical volume
   IV. Investor sentiment

   a. I and II only
   b. I and III only
   c. I, III, and IV only
   d. I, II, III, and IV

8. **Technical Analysis** Which of the following technical measures has the effect of smoothing out day-to-day price fluctuations?

   a. Moving average charts
   b. Advance/decline lines
   c. Candlestick charts
   d. Point-and-figure charts

9. **Technical Analysis** Which of the following statements would a technical analyst agree with?

   a. Financial statements provide invaluable information concerning a company's stock price.
   b. The value of a share of stock should always be the present value of future dividends.
   c. The stock market is at least weak-form efficient.
   d. Stock prices follow patterns which repeat over time.

10. **Technical Analysis** Suppose a stock breaks through a support level. According to technical analysis, you should

    a. Buy the stock.
    b. Sell the stock.
    c. Do nothing since this is a congestion area.
    d. Buy the stock on margin.

11. **Advance/Decline Lines** An upward-sloping advance/decline line is considered_____, and a heavy advancing volume is considered _____.

    a. bearish; bearish
    b. bearish; bullish
    c. bullish; bullish
    d. bullish; bearish

12. **Behavioural Finance Concepts** Which of the following topics related to behavioural finance deals with the idea that investors experience more pain from a loss than pleasure from a comparable gain?

    a. Frame dependence
    b. Prospect theory
    c. Loss aversion
    d. Mental accounting

13. **Limits to Arbitrage** Which of the following is not a reason that rational, well-capitalized investors can correct a mispricing, at least not immediately?

    a. Firm-specific risk
    b. Implementation costs
    c. Aversion risk
    d. Noise trader risk

14. **Technical Indicators** Which of the following techniques deals with the breadth of the market?

    a. Price channels
    b. Advance/decline lines
    c. Bollinger bands
    d. Support and resistance lines

15. **Technical Indicators** Which of the following techniques does not assume there are psychologically important barriers in stock prices?

    a. Price channels
    b. Advance/decline lines
    c. Bollinger bands
    d. Support and resistance lines

Concept Questions

1. **Dow Theory** In the context of Dow theory, what are the three forces at work at all times? Which is the most important?

2. **Technical Analysis** To a technical analyst, what are support and resistance areas?

3. **Dow Theory** In the context of Dow theory, what are corrections and confirmations?

4. **Bad Breadth?** On a particular day, the stock market as a whole is up; however, losers outnumber gainers by 2,000 to 1,600. What might a technical analyst conclude?

5. **A Call to Arms** How is the Arms ratio computed? What is it designed to capture?

6. **Bad Timing?** A key concern in technical analysis such as the Dow theory is to identify turning points in market direction and thereby time the market. What are the implications of market efficiency for market timing?

7. **Dow Theory** Why do you think the industrial and transportation averages are the two that underlie Dow theory?

8. **Limits to Arbitrage** In the chapter, we discussed the 3Com/Palm and Royal Dutch/Shell mispricings. Which of the limits to arbitrage would least likely be the main reason for these mispricings? Explain.

9. **Contrarian Investing** What does it mean to be a contrarian investor? How would a contrarian investor use technical analysis?

10. **Technical Analysis** A frequent argument against the usefulness of technical analysis is that trading on a pattern has the effect of destroying the pattern. Explain what this means.

11. **Gaps** Gaps are another technical analysis tool used in conjunction with open-high-low-close charts. A gap occurs when either the low price for a particular day is higher than the high price from the previous day, or the high price for a day is lower than the low price from the previous day. Do you think gaps are a bullish or bearish signal? Why?

12. **Probabilities** Suppose you are flipping a fair coin in a coin-flipping contest and have flipped eight heads in a row. What is the probability of flipping a head on your next coin flip? Suppose you flipped a head on your ninth toss. What is the probability of flipping a head on your tenth toss?

13. **Prospect Theory** How do prospect theory and the concept of a rational investor differ?

14. **Frame Dependence** How can frame dependence lead to irrational investment decisions?

15. **Noise Trader Risk** What is noise trader risk? How can noise trader risk lead to market inefficiencies?

16. **Overconfidence** Do you think there are differences in female and male investors' behaviour? Which group exhibit higher overconfidence? Explain.

17. **Hot-Hand Fallacy** Explain hot-hand fallacy.

18. **Behavioural Finance** How do financial managers use behavioural finance in their decision making?

Questions and Problems

Core Questions

1. **Advance/Decline Lines** Use the data below to construct the advance/decline line for the stock market. Volume figures are in thousands of shares.

	Advancing	Adv. Vol.	Declining	Dec. Vol.
Monday	1,893	1,077,176	1,159	542,400
Tuesday	1,833	1,172,094	1,211	733,082
Wednesday	1,705	987,314	1,411	845,305
Thursday	1,821	1,042,316	1,305	750,318
Friday	1,784	1,258,634	1,187	645,847

2. **Calculating Arms Ratio** Using the data in the previous problem, construct the Arms ratio on each of the five trading days.

3. **Simple Moving Averages** The table below shows the closing monthly stock prices for Amazon.com and Walt Disney. Calculate the simple three-month moving average for each month for both companies.

	AMZN	DIS
February	$35.18	$27.94
March	34.27	29.73
April	32.36	26.40
May	35.51	27.44
June	33.09	25.18
July	45.15	25.64
August	42.70	25.19
September	45.30	24.13
October	39.86	24.37
November	47.99	25.05

4. **Exponential Moving Averages** Using the stock prices in the previous problem, calculate the exponential three-month moving average for both stocks where two-thirds of the average weight is placed on the most recent price.

5. **Exponential Moving Averages** Calculate the exponential three-month moving average for <u>Amazon.com</u> and Walt Disney where 50 percent of the average weight is placed on the most recent price. How does this exponential moving average compare to your result from the previous problem?

6. **Market Sentiment Index** A group of investors was polled each week for the last five weeks about whether they were bullish or bearish concerning the market. Construct the market sentiment index for each week based on these polls. Assuming the market sentiment index is being used as a contrarian indicator, which direction would you say the market is headed?

Week	Bulls	Bears
1	72	78
2	70	80
3	79	71
4	68	82
4	63	87

7. **Money Flow** You are given the following information concerning the trades made on a particular stock. Calculate the money flow for the stock based on these trades. Is the money flow a positive or negative signal in this case?

Price	Volume
$84.12	
84.16	5,000
84.15	2,400
84.17	1,800
84.19	3,400
84.23	1,700
84.20	4,600

8. **Moving Averages** Suppose you are given the following information on the S&P 500:

Date	Close
8-Nov-05	1218.59
9-Nov-05	1220.65
10-Nov-05	1230.96
11-Nov-05	1234.72
14-Nov-05	1233.76
15-Nov-05	1229.01
16-Nov-05	1231.21
17-Nov-05	1242.80
18-Nov-05	1248.27
21-Nov-05	1254.85

Calculate the simple three-day moving average for the S&P 500 and the exponential three-day moving average where two-thirds of the weight is placed on the most recent close. Why would you want to know the moving average for an index? If the close on November 22, 2005, was above the three-day moving average, would it be a buy or sell signal?

9. **Support and Resistance Levels.** Below you will see a stock price chart for Encana from co.finance.yahoo.com. Do you see any resistance or support levels? What do support and resistance levels mean for the stock price?
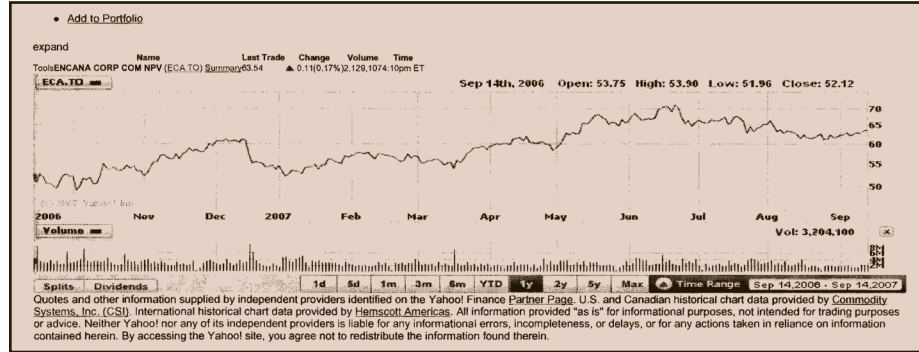
10. **Advance/Decline Lines and Arms Ratio** Use the data below to construct the advance/decline line and Arms ratio for the market. Volume is in thousands of shares.

	Advancing	Advancing Vol.	Declining	Declining Vol.
Monday	1,132	987,064	2,205	1,203,543
Tuesday	1,287	843,456	2,103	1,356,406
Wednesday	1,451	864,056	1,978	1,135,056
Thursday	1,682	1,013,168	1,796	980,673
Friday	1,508	990,731	1,834	1,206,650

11. **Money Flow** A stock had the following trades during a particular period. What was the money flow for the stock? Is the money flow a positive or negative signal in this case?

| Price	Volume
$43.87	
43.89	1,600
43.88	1,200
43.90	600
43.90	1,400
43.88	1,100
43.86	800
43.84	1,300
43.83	1,400
43.82	1,000

Intermediate Questions

12. **Fibonacci Numbers** A stock recently increased in price from $78 to $95. Using ϕ, what are the primary and secondary support areas for the stock?

13. **Simple Moving Averages** Below you will find the closing stock prices for eBay over a three-week period. Calculate the simple three-day and five-day moving averages for the stock and graph your results. Are there any technical indications of the future direction of the stock price?

Date	Close
31-Oct-05	$39.61
1-Nov-05	40.27
2-Nov-05	41.08
3-Nov-05	41.55
4-Nov-05	41.58
7-Nov-05	41.87
8-Nov-05	42.30
9-Nov-05	42.08
10-Nov-05	43.31
11-Nov-05	43.89
14-Nov-05	43.53
15-Nov-05	43.05
16-Nov-05	42.54
17-Nov-05	43.80
18-Nov-05	44.67

14. **Exponential Moving Averages** Use the information from the previous problem to calculate the three-day and five-day exponential moving averages for eBay and graph your results. Place two-thirds of the average weight on the most recent stock price. Are there any technical indications of the future direction of the stock price?

15. **Put/Call Ratio.** Another technical indicator is the put/call ratio. The put/call ratio is the number of put options traded divided by the number of call options traded. The put/call ratio can be constructed on the market or an individual stock. Below you will find the number of puts and calls traded over a four-week period for all stocks:

Week	Puts	Calls
1	467,152	645,132
2	508,612	497,163
3	498,344	532,628
4	520,197	625,981

How would you interpret the put/call ratio? Calculate the put/call ratio for each week. From this analysis, does it appear the market is expected to be upward trending or downward trending?
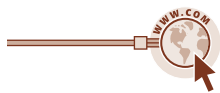
What's on the Web?

1. **Bollinger Bands** You can learn more about Bollinger bands at www.chartsmart.com. What does the site say about using Bollinger bands in technical analysis? Now go to finance.yahoo.com, and enter your favourite stock. Find the technical analysis section and view the Bollinger band for your stock. What does the chart tell you about this stock?

2. **Relative Strength** Relative strength measures the performance of a stock against a "bogey," which is either another stock or suitable index. Pick your favourite stock and go to the technical analysis area of finance.yahoo.com. Compare the relative strength of your stock against a close competitor and the TSX / S&P Composite Index. How is this stock performing relative to these bogeys?

3. **Triangles** Go to www.borsanaliz.com/eng. How many different types of triangles are listed on the site? What does each type of triangle mean to a technical analyst?

4. **Market Volume** An important tool for most technical traders is market volume. Go to www.marketvolume.com. Look on the site to find the reasons market volume is considered important.