

Efficient Capital Markets and Behavioral Challenges

CHAPTER

13

OPENING CASE

The decade of the 2000s proved to be one of the more interesting in stock market history. Following a spectacular rise in the late 1990s, the NASDAQ lost about 40 percent of its value in 2000, followed by another 30 percent in 2001. The ISDEX, an index of Internet-related stocks, rose from 100 in January 1996 to 1,100 in February 2000, a gain of about 1,000 percent! It then fell like a rock to 600 by May 2000. The end of the decade saw almost exactly the reverse. From January 2008 through March 9, 2009, the S&P 500 lost about 57 percent of its value. Of course, from that point until the end of March 2010, the market roared back, gaining almost 73 percent.

The performance of the NASDAQ in the late 1990s, and particularly the rise and fall of Internet stocks, has been described by many as one of the greatest market “bubbles” in history. The argument is that prices were inflated to economically ridiculous levels before investors came to their senses, which then caused the bubble to pop and prices to plunge. Debate over whether the stock market of the late 1990s really was a bubble has generated much controversy. Similarly, the reasons behind the market’s collapse in 2008 and its subsequent rebound in 2009 and early 2010 are being hotly debated. In this chapter, we will discuss the competing ideas, present some evidence on both sides, and then examine the implications for financial managers.

PART FOUR Capital Structure and Dividend Policy

13.1 CAN FINANCING DECISIONS CREATE VALUE?

Earlier parts of the book show how to evaluate projects according to the net present value criterion. The real world is a competitive one where projects with positive net present value are not always easy to come by. However, through hard work or through good fortune, a firm can identify winning projects. For example, to create value from capital budgeting decisions, the firm is likely to:

1. Locate an unsatisfied demand for a particular product or service.
2. Create a barrier to make it more difficult for other firms to compete.
3. Produce products or services at lower cost than the competition.
4. Be the first to develop a new product.

The next five chapters concern *financing* decisions. Typical financing decisions include how much debt and equity to sell, what types of debt and equity to sell, and when to sell them. Just as the net present value criterion was used to evaluate capital budgeting projects, we now want to use the same criterion to evaluate financing decisions.

Though the procedure for evaluating financing decisions is identical to the procedure for evaluating projects, the results are different. It turns out that the typical firm has many more capital expenditure opportunities with positive net present values than financing opportunities with positive net present values. In fact, we later show that some plausible financial models imply that no valuable financial opportunities exist at all.

Though this dearth of profitable financing opportunities will be examined in detail later, a few remarks are in order now. We maintain that there are basically three ways to create valuable financing opportunities:

1. *Fool Investors.* Assume that a firm can raise capital either by issuing stock or by issuing a more complex security, say, a combination of stock and warrants. Suppose that, in truth, 100 shares of stock are worth the same as 50 units of our complex security. If investors have a misguided, overly optimistic view of the complex security, perhaps the 50 units can be sold for more than the 100 shares of stock can be. Clearly this complex security provides a valuable financing opportunity because the firm is getting more than fair value for it.

Financial managers try to package securities to receive the greatest value. A cynic might view this as attempting to fool investors.

However, the theory of efficient capital markets implies that investors cannot easily be fooled. It says that securities are appropriately priced at all times, implying that the market as a whole is very shrewd indeed. In our example, 50 units of the complex security would sell for the same price as 100 shares of stock. Thus, corporate managers cannot attempt to create value by fooling investors. Instead, managers must create value in other ways.

2. *Reduce Costs or Increase Subsidies.* We show later in the book that certain forms of financing have greater tax advantages than other forms. Clearly, a firm packaging securities to minimize taxes can increase firm value. In addition, any financing technique involves other costs. For example, investment bankers, lawyers, and accountants must be paid. A firm packaging securities to minimize these costs can also increase its value.

EXAMPLE 13.1

Valuing Financial Subsidies

Suppose Vermont Electronics Company is thinking about relocating its plant to Mexico where labor costs are lower. In the hope that it can stay in Vermont, the company has submitted an application to the state of Vermont to issue \$2 million in five-year, tax-exempt industrial bonds. The coupon rate on industrial revenue bonds in Vermont is currently 5 percent. This is an attractive rate because the normal cost of debt capital for Vermont Electronics Company is 10 percent. What is the NPV of this potential financing transaction?

If the application is accepted and the industrial revenue bonds are issued by the Vermont Electronics Company, the NPV (ignoring corporate taxes) is:

$$\begin{aligned} \text{NPV} &= \$2,000,000 - \left[\frac{\$100,000}{1.1} + \frac{\$100,000}{(1.1)^2} + \frac{\$100,000}{(1.1)^3} + \frac{\$100,000}{(1.1)^4} + \frac{\$2,100,000}{(1.1)^5} \right] \\ &= \$2,000,000 - \$1,620,921 \\ &= \$379,079 \end{aligned}$$

This transaction has a positive NPV. The Vermont Electronics Company obtains subsidized financing where the value of the subsidy is \$379,079.

3. *Create a New Security.* There has been a surge in financial innovation in recent years. For example, in a speech on financial innovation, Nobel laureate Merton Miller asked the rhetorical question, “Can any twenty-year period in recorded history have witnessed even a tenth as much new development? Where corporations once issued only straight debt and straight common stock, they now issue zero coupon bonds, adjustable rate notes, floating-rate notes, putable bonds, credit enhanced debt securities, receivable-backed securities, adjusted-rate preferred stock, convertible adjustable preferred stock, auction rate preferred stock, single-point adjustable rate stock, convertible exchangeable preferred stock, adjustable-rate convertible debt, zero coupon convertible debt, debt with mandatory common stock purchase contracts—to name just a few!”¹ And, financial innovation has occurred even more rapidly in the years following Miller’s speech.

Though the advantage of each instrument is different, one general theme is that these new securities cannot easily be duplicated by combinations of existing securities. Thus, a previously unsatisfied clientele may pay extra for a specialized security catering to its needs. For example, putable bonds let the purchaser sell the bond at a fixed price back to the firm. This innovation creates a price floor, allowing the investor to reduce his or her downside risk. Perhaps risk-averse investors or investors with little knowledge of the bond market would find this feature particularly attractive.

Corporations gain by issuing these unique securities at high prices. However, the value captured by the innovator may well be small in the long run because the innovator usually cannot patent or copyright his idea. Soon many firms are issuing securities of the same kind, forcing prices down as a result.

This brief introduction sets the stage for the next several chapters of the book. The rest of this chapter examines the efficient capital markets hypothesis. We show that if capital markets are efficient, corporate managers cannot create value by fooling investors. This is quite important, because managers must create value in other, perhaps more difficult, ways. The following chapters concern the costs and subsidies of various forms of financing.

13.2 A DESCRIPTION OF EFFICIENT CAPITAL MARKETS

An efficient capital market is one in which stock prices fully reflect available information. To illustrate how an efficient market works, suppose the F-stop Camera Corporation (FCC) is attempting to develop a camera that will double the speed of the auto-focusing system now available. FCC believes this research has positive NPV.

Now consider a share of stock in FCC. What determines the willingness of investors to hold shares of FCC at a particular price? One important factor is the probability that FCC will be the first company to develop the new auto-focusing system. In an efficient market, we would expect the price of the shares of FCC to increase if this probability increases.

Suppose FCC hires a well-known engineer to develop the new auto-focusing system. In an efficient market, what will happen to FCC’s share price when this is announced? If the well-known scientist is paid a salary that fully reflects his or her contribution to the firm, the price of the stock will not necessarily change. Suppose, instead, that hiring the scientist is a positive NPV transaction. In this case, the price of shares in FCC will increase because the firm can pay the scientist a salary below his or her true value to the company.

¹M. Miller, “Financial Innovation: The Last Twenty Years and the Next,” *Journal of Financial and Quantitative Analysis* (December 1986). However, Peter Tufano, “Securities Innovations: A Historical and Functional Perspective,” *Journal of Applied Corporate Finance* (Winter 1995), shows that many securities commonly believed to have been invented in the 1970s and 1980s can be traced as far back as the 1830s.

When will the increase in the price of FCC's shares take place? Assume that the hiring announcement is made in a press release on Wednesday morning. In an efficient market, the price of shares in FCC will *immediately* adjust to this new information. Investors should not be able to buy the stock on Wednesday afternoon and make a profit on Thursday. This would imply that it took the stock market a day to realize the implication of the FCC press release. The efficient market hypothesis predicts that the price of shares of FCC stock on Wednesday afternoon will already reflect the information contained in the Wednesday morning press release.

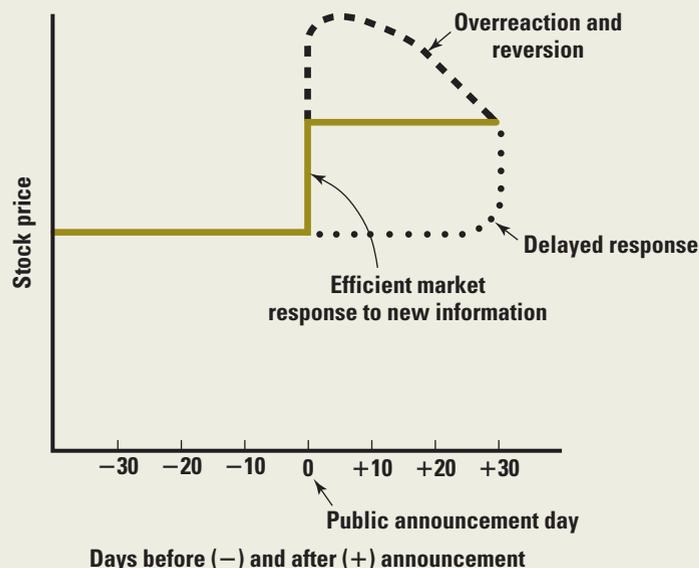
The **efficient market hypothesis** (EMH) has implications for investors and for firms.

- Because information is reflected in prices immediately, investors should only expect to obtain a normal rate of return. Awareness of information when it is released does an investor no good. The price adjusts before the investor has time to trade on it.
- Firms should expect to receive fair value for securities that they sell. *Fair* means that the price they receive for the securities they issue is the present value. Thus, valuable financing opportunities that arise from fooling investors are unavailable in efficient capital markets.

Figure 13.1 presents several possible adjustments in stock prices. The solid line represents the path taken by the stock in an efficient market. In this case the price adjusts immediately to the new information with no further price changes. The dotted line depicts a delayed reaction. Here it takes the market 30 days to fully absorb the information. Finally, the broken line illustrates an overreaction and subsequent correction back to the true price. The broken line and the dotted line show the paths that the stock price might take in an

FIGURE 13.1

Reaction of Stock Price to New Information in Efficient and Inefficient Markets



Efficient market response: The price instantaneously adjusts to and fully reflects new information; there is no tendency for subsequent increases and decreases.

Delayed response: The price adjusts slowly to the new information; 30 days elapse before the price completely reflects the new information.

Overreaction: The price overadjusts to the new information; there is a bubble in the price sequence.

inefficient market. If the price of the stock were to take several days to adjust, trading profits would be available to investors who suitably timed their purchases and sales.²

Foundations of Market Efficiency

Figure 13.1 shows the consequences of market efficiency. But what are the conditions that *cause* market efficiency? Andrei Shleifer argues that there are three conditions, any one of which will lead to efficiency:³ (1) rationality, (2) independent deviations from rationality, and (3) arbitrage. A discussion of these conditions follows.

RATIONALITY Imagine that all investors are rational. When new information is released in the marketplace, all investors will adjust their estimates of stock prices in a rational way. In our example, investors will use the information in FCC's press release, in conjunction with existing information on the firm, to determine the NPV of FCC's new venture. If the information in the press release implies that the NPV of the venture is \$10 million and there are 2 million shares, investors will calculate that the NPV is \$5 per share. While FCC's old price might be, say, \$40, no one would now transact at that price. Anyone interested in selling would only sell at a price of at least \$45 ($= \$40 + 5$). And anyone interested in buying would now be willing to pay up to \$45. In other words, the price would rise by \$5. And the price would rise immediately, since rational investors would see no reason to wait before trading at the new price.

Of course, we all know times when family members, friends, and yes, even ourselves seem to behave less than perfectly rationally. Thus, perhaps it is too much to ask that *all* investors behave rationally. But the market will still be efficient if the following scenario holds.

INDEPENDENT DEVIATIONS FROM RATIONALITY Suppose that FCC's press release is not all that clear. How many new cameras are likely to be sold? At what price? What is the likely cost per camera? Will other camera companies be able to develop competing products? How long is this likely to take? If these, and other, questions cannot be answered easily, it will be difficult to estimate NPV.

Now imagine that, with so many questions going unanswered, many investors do not think clearly. Some investors might get caught up in the romance of a new product, hoping, and ultimately believing, in sales projections well above what is rational. They would overpay for new shares. And if they needed to sell shares (perhaps to finance current consumption), they would do so only at a high price. If these individuals dominate the market, the stock price would likely rise beyond what market efficiency would predict.

However, due to emotional resistance, investors could just as easily react to new information in a pessimistic manner. After all, business historians tell us that investors were initially quite skeptical about the benefits of the telephone, the copier, the automobile, and the motion picture. Certainly, they could be overly skeptical about this new camera. If investors were primarily of this type, the stock price would likely rise less than market efficiency would predict.

²Now you should understand the following short story. A student was walking down the hall with his finance professor when they both saw a \$20 bill on the ground. As the student bent down to pick it up, the professor shook his head slowly and, with a look of disappointment on his face, said patiently to the student, "Don't bother. If it was really there, someone else would have already picked it up."

The moral of the story reflects the logic of the efficient market hypothesis: If you think you have found a pattern in stock prices or a simple device for picking winners, you probably have not. If there were such a simple way to make money, someone else would have found it before. Furthermore, if people tried to exploit the information, their efforts would become self-defeating and the pattern would disappear.

³Andrei Shleifer, *Inefficient Markets: An Introduction to Behavioral Finance*, Oxford University Press, Oxford, United Kingdom (2000).

But suppose that about as many individuals were irrationally optimistic as were irrationally pessimistic. Prices would likely rise in a manner consistent with market efficiency, even though most investors would be classified as less than fully rational. Thus, market efficiency does not require rational individuals, only countervailing irrationalities.

However, this assumption of offsetting irrationalities at *all* times may be unrealistic. Perhaps, at certain times, most investors are swept away by excessive optimism and, at other times, are caught in the throes of extreme pessimism. But even here, there is an assumption that will produce efficiency.

ARBITRAGE Imagine a world with two types of individuals: the irrational amateurs and the rational professionals. The amateurs get caught up in their emotions, at times believing irrationally that a stock is undervalued and at other times believing the opposite. If the passions of the different amateurs do not cancel each other out, these amateurs, by themselves, would tend to carry stocks either above or below their efficient prices.

Now let's bring in the professionals. Suppose professionals go about their business methodically and rationally. They study companies thoroughly, they evaluate the evidence objectively, they estimate stock prices coldly and clearly, and they act accordingly. If a stock is underpriced, they would buy it. If overpriced, they would sell it. And their confidence would likely be greater than that of the amateurs. While an amateur might risk only a small sum, these professionals might risk large ones, *knowing* as they do that the stock is mispriced. Furthermore, they would be willing to rearrange their entire portfolio in search of a profit. If they find that General Motors is underpriced, they might sell the Ford stock they own in order to buy GM. *Arbitrage* is the word that comes to mind here, since arbitrage generates profit from the simultaneous purchase and sale of different, but substitute, securities. If the arbitrage of professionals dominates the speculation of amateurs, markets would still be efficient.

13.3 THE DIFFERENT TYPES OF EFFICIENCY

In our previous discussion, we assumed that the market responds immediately to all available information. In actuality, certain information may affect stock prices more quickly than other information. To handle differential response rates, researchers separate information into different types. The most common classification system identifies three types: information on past prices, publicly available information, and all information. The effect of these three information sets on prices is examined next.

The Weak Form

Imagine a trading strategy that recommends buying a stock after it has gone up three days in a row and recommends selling a stock after it has gone down three days in a row. This strategy uses information based only on past prices. It does not use any other information, such as earnings, forecasts, merger announcements, or money supply figures. A capital market is said to be *weakly efficient*, or to satisfy **weak form efficiency**, if it fully incorporates the information in past stock prices. Thus, the above strategy would not be able to generate profits if weak form efficiency holds.

Weak form efficiency is about the weakest type of efficiency that we would expect a financial market to display because historical price information is the easiest kind of information about a stock to acquire. If it were possible to make extraordinary profits simply by finding patterns in stock price movements, everyone would do it, and any profits would disappear in the scramble.

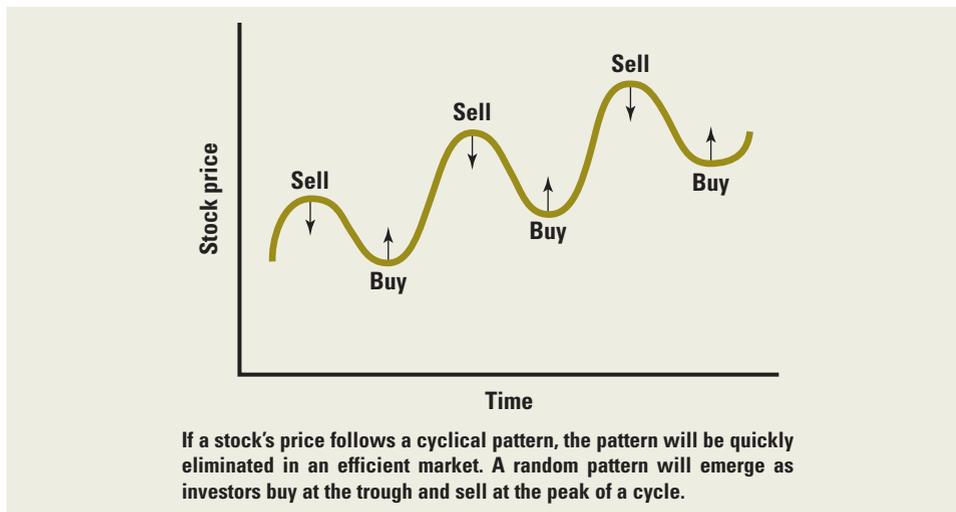


FIGURE 13.2

Investor Behavior Tends to Eliminate Cyclical Patterns

This effect of competition can be seen in Figure 13.2. Suppose the price of a stock displays a cyclical pattern, as indicated by the wavy curve. Shrewd investors would buy at the low points, forcing those prices up. Conversely, they would sell at the high points, forcing prices down. Via competition, cyclical regularities would be eliminated, leaving only random fluctuations.

The Semistrong and Strong Forms

If weak form efficiency is controversial, even more contentious are the two stronger types of efficiency, **semistrong form efficiency** and **strong form efficiency**. A market is semistrong form efficient if prices reflect (incorporate) all publicly available information, including information such as published accounting statements for the firm as well as historical price information. A market is strong form efficient if prices reflect all information, public or private.

The information set of past prices is a subset of the information set of publicly available information, which in turn is a subset of all information. This is shown in Figure 13.3. Thus, strong form efficiency implies semistrong form efficiency, and semistrong form efficiency implies weak form efficiency. The distinction between semistrong form efficiency and weak form efficiency is that semistrong form efficiency requires not only that the market be efficient with respect to historical price information, but that *all* of the information available to the public be reflected in prices.

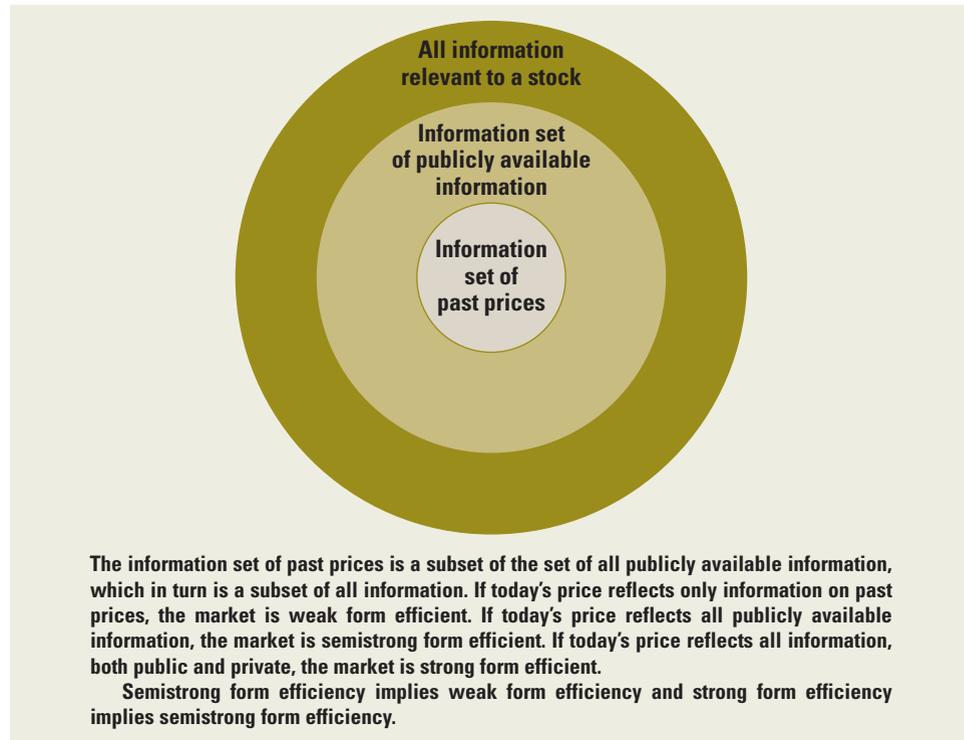
To illustrate the different forms of efficiency, imagine an investor who always sold a particular stock after its price had risen. A market that was only weak form efficient and not semistrong form efficient would still prevent such a strategy from generating positive profits. According to weak form efficiency, a recent price rise does not imply that the stock is overvalued.

Now consider a firm reporting increased earnings. An individual might consider investing in the stock after hearing of the news release giving this information. However, if the market is semistrong form efficient, the price should rise immediately upon the news release. Thus, the investor would end up paying the higher price, eliminating all chance for profit.

At the furthest end of the spectrum is strong form efficiency. This form says that anything that is pertinent to the value of the stock and that is known to at least one investor is, in fact, fully incorporated into the stock price. A strict believer in strong form efficiency would deny that an insider who knew whether a company mining operation

FIGURE 13.3

Relationship among
Three Different
Information Sets



had struck gold could profit from that information. Such a devotee of the strong form efficient market hypothesis might argue that as soon as the insider tried to trade on his or her information, the market would recognize what was happening, and the price would shoot up before he or she could buy any of the stock. Alternatively, believers in strong form efficiency argue that there are no secrets, and as soon as the gold is discovered, the secret gets out.

One reason to expect that markets are weak form efficient is that it is so cheap and easy to find patterns in stock prices. Anyone who can program a computer and knows a little bit of statistics can search for such patterns. It stands to reason that if there were such patterns, people would find and exploit them, in the process causing them to disappear.

Semistrong form efficiency, though, implies more sophisticated investors than does weak form efficiency. An investor must be skilled at economics and statistics, and steeped in the idiosyncrasies of individual industries and companies. Furthermore, to acquire and use such skills requires talent, ability, and time. In the jargon of the economist, such an effort is costly and the ability to be successful at it is probably in scarce supply.

As for strong form efficiency, this is just farther down the road than semistrong form efficiency. It is difficult to believe that the market is so efficient that someone with valuable inside information cannot prosper from it. And empirical evidence tends to be unfavorable to this form of market efficiency.

Some Common Misconceptions about the Efficient Market Hypothesis

No idea in finance has attracted as much attention as that of efficient markets, and not all of the attention has been flattering. To a certain extent, this is because much of the criticism has been based on a misunderstanding of what the hypothesis does and does not say. We illustrate three misconceptions below.

THE EFFICACY OF DART THROWING When the notion of market efficiency was first publicized and debated in the popular financial press, it was often characterized by the following quote: “. . . throwing darts at the financial page will produce a portfolio that can be expected to do as well as any managed by professional security analysts.”^{4,5} This is almost, but not quite, true.

All the efficient market hypothesis really says is that, on average, the manager will not be able to achieve an abnormal or excess return. The excess return is defined with respect to some benchmark expected return, such as that from the security market line (SML) of Chapter 11. The investor must still decide how risky a portfolio he or she wants. In addition, a random dart thrower might wind up with all of the darts sticking into one or two high-risk stocks that deal in genetic engineering. Would you really want all of your stock investments in two such stocks?

The failure to understand this has often led to a confusion about market efficiency. For example, sometimes it is wrongly argued that market efficiency means that it does not matter what you do because the efficiency of the market will protect the unwary. However, someone once remarked, “The efficient market protects the sheep from the wolves, but nothing can protect the sheep from themselves.”

What efficiency does say is that the price that a firm obtains when it sells a share of its stock is a fair price in the sense that it reflects the value of that stock given the information that is available about it. Shareholders need not worry that they are paying too much for a stock with a low dividend or some other characteristic, because the market has already incorporated it into the price. However, investors still have to worry about such things as their level of risk exposure and their degree of diversification.

PRICE FLUCTUATIONS Much of the public is skeptical of efficiency because stock prices fluctuate from day to day. However, daily price movement is in no way inconsistent with efficiency; a stock in an efficient market adjusts to new information by changing price. A great deal of new information comes into the stock market each day. In fact, the *absence* of daily price movements in a changing world might suggest an inefficiency.

STOCKHOLDER DISINTEREST Many laypersons are skeptical that the market price can be efficient if only a fraction of the outstanding shares changes hands on any given day. However, the number of traders in a stock on a given day is generally far less than the number of people following the stock. This is true because an individual will trade only when his appraisal of the value of the stock differs enough from the market price to justify incurring brokerage commissions and other transaction costs. Furthermore, even if the number of traders following a stock is small relative to the number of outstanding shareholders, the stock can be expected to be efficiently priced as long as a number of interested traders use the publicly available information. That is, the stock price can reflect the available information even if many stockholders never follow the stock and are not considering trading in the near future.

13.4 THE EVIDENCE

The evidence on the efficient market hypothesis is extensive, with studies covering the broad categories of weak form, semistrong form, and strong form efficiency. In the first category we investigate whether stock price changes are random. We review both *event studies* and studies of the performance of mutual funds in the second category. In the third category, we look at the performance of corporate insiders.

⁴B. G. Malkiel, *A Random Walk Down Wall Street*, 7th ed. (New York: Norton, 1999).

⁵Older articles often referred to the benchmark of “dart-throwing monkeys.” As government involvement in the securities industry grew, the benchmark was oftentimes restated as “dart-throwing congressmen.”

The Weak Form

Weak form efficiency implies that a stock's price movement in the past is unrelated to its price movement in the future. The work of Chapter 11 allows us to test this implication. In that chapter, we discussed the concept of correlation between the returns on two different stocks. For example, the correlation between the return on General Motors and the return on Ford is likely to be relatively high because both stocks are in the same industry. Conversely, the correlation between the return on General Motors and the return on the stock of, say, a European fast-food chain is likely to be low.

Financial economists frequently speak of **serial correlation**, which involves only one security. This is the correlation between the current return on a security and the return on the same security over a later period. A positive coefficient of serial correlation for a particular stock indicates a tendency toward *continuation*. That is, a higher-than-average return today is likely to be followed by higher-than-average returns in the future. Similarly, a lower-than-average return today is likely to be followed by lower-than-average returns in the future.

A negative coefficient of serial correlation for a particular stock indicates a tendency toward *reversal*. A higher-than-average return today is likely to be followed by lower-than-average returns in the future. Similarly, a lower-than-average return today is likely to be followed by higher-than-average returns in the future. Both significantly positive and significantly negative serial correlation coefficients are indications of market inefficiencies; in either case, returns today can be used to predict future returns.

Serial correlation coefficients for stock returns near zero would be consistent with weak form efficiency. Thus, a current stock return that is higher than average is as likely to be followed by lower-than-average returns as by higher-than-average returns. Similarly, a current stock return that is lower than average is as likely to be followed by higher-than-average returns as by lower-than-average returns.

Table 13.1 shows the serial correlation for daily stock price changes for eight large U.S. companies. These coefficients indicate whether or not there are relationships between yesterday's return and today's return. As can be seen, the correlation coefficients for half of the companies are negative, implying that a higher-than-average return today makes a lower-than-average return tomorrow slightly more likely. Conversely, the correlation coefficients for the other four companies are slightly positive, implying that a higher-than-average return today makes a higher-than-average return tomorrow slightly more likely.

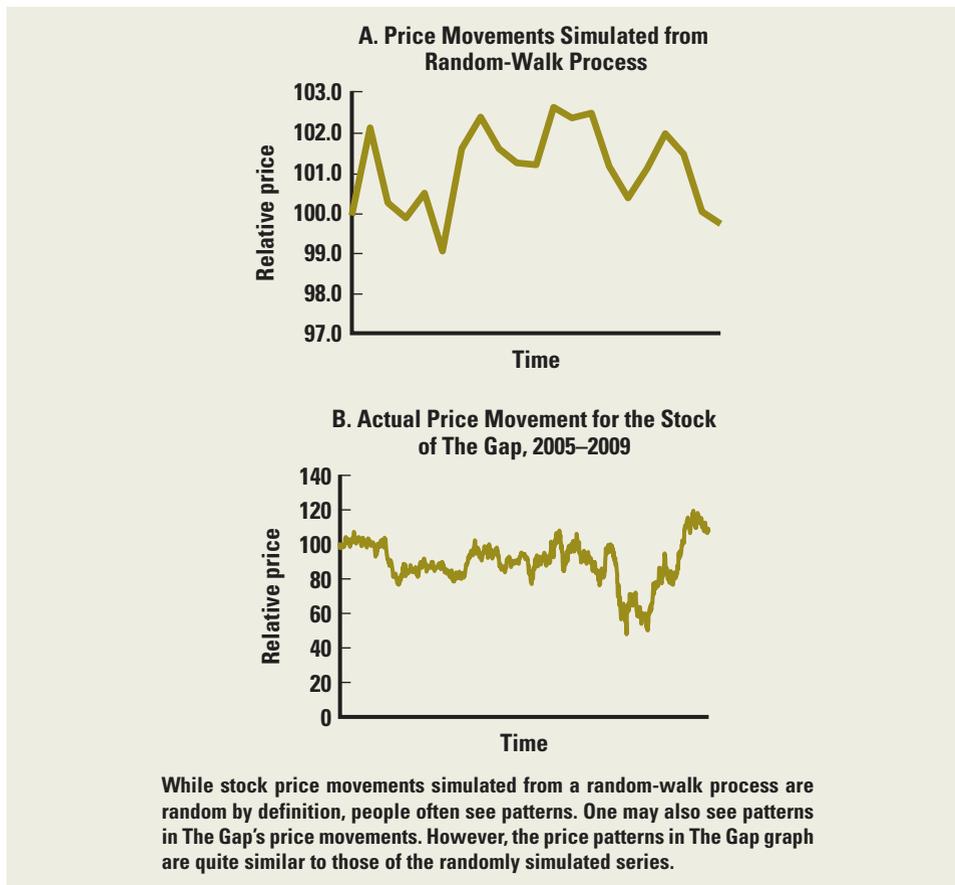
TABLE 13.1
Serial Correlation
Coefficients for Selected
Companies, 2005–2009

COMPANY	SERIAL CORRELATION COEFFICIENT
Apple	−0.0075
Caterpillar	0.0090
CONSOL Energy	0.0203
Eastman Kodak	0.0265
Estee Lauder	−0.0275
Fastenal	0.0073
Goodyear Tire & Rubber	0.0111
Google	−0.0223

Eastman Kodak's coefficient of 0.0265 is slightly positive, implying that a positive return today makes a positive return tomorrow slightly more likely. Google's coefficient is negative, implying that a negative return today makes a positive return tomorrow slightly more likely. However, the coefficients are so small relative to estimation error and transaction costs that the results are generally considered to be consistent with efficient capital markets.

FIGURE 13.4

Simulated and Actual Stock Price Movements



However, because correlation coefficients can, in principle, vary between -1 and 1 , the reported coefficients are quite small. In fact, the coefficients are so small relative to both estimation errors and to transaction costs that the results are generally considered to be consistent with weak form efficiency.

The weak form of the efficient market hypothesis has been tested in many other ways as well. Our view of the literature is that the evidence, taken as a whole, is consistent with weak form efficiency.

This finding raises an interesting thought: If price changes are truly random, why do so many believe that prices follow patterns? The work of both psychologists and statisticians suggests that most people simply do not know what randomness looks like. For example, consider Figure 13.4. The top graph was generated by a computer using random numbers. Yet, we have found that people examining the chart generally see patterns. Different people see different patterns and forecast different future price movements. However, in our experience, viewers are all quite confident of the patterns they see.

Next, consider the bottom graph, which tracks actual movements in The Gap's stock price. This graph may look quite nonrandom to some, suggesting weak form inefficiency. However, statistical tests indicate that it indeed behaves like a purely random series. Thus, in our opinion, people claiming to see patterns in stock price data are probably seeing optical illusions.

The Semistrong Form

The semistrong form of the efficient market hypothesis implies that prices should reflect all publicly available information. We present two types of tests of this form.

EVENT STUDIES The *abnormal return* (AR) on a given stock for a particular day can be calculated by subtracting the market's return on the same day (R_m)—as measured by a broad-based index such as the S&P composite index—from the actual return (R) on the stock for that day. We write this algebraically as:

$$AR = R - R_m$$

The following system will help us understand tests of the semistrong form:

Information released at time $t - 1 \rightarrow AR_{t-1}$

Information released at time $t \rightarrow AR_t$

Information released at time $t + 1 \rightarrow AR_{t+1}$

The arrows indicate that the abnormal return in any time period is related only to the information released during that period.

According to the efficient market hypothesis, a stock's abnormal return at time t , AR_t , should reflect the release of information at the same time, t . Any information released before then should have no effect on abnormal returns in this period, because all of its influence should have been felt before. In other words, an efficient market would already have incorporated previous information into prices. Because a stock's return today cannot depend on what the market does not yet know, information that will be known only in the future cannot influence the stock's return either. Hence the arrows point in the direction that is shown, with information in any one time period affecting only that period's abnormal return. *Event studies* are statistical studies that examine whether the arrows are as shown or whether the release of information influences returns on other days.

These studies also speak of *cumulative abnormal returns* (CARs), as well as abnormal returns (ARs). As an example, consider a firm with ARs of 1 percent, -3 percent, and 6 percent for dates -1 , 0 , and 1 relative to a corporate announcement. The CARs for dates -1 , 0 , and 1 would be 1 percent, -2 percent [= 1 percent + (-3 percent)], and 4 percent [= 1 percent + (-3 percent) + 6 percent], respectively.

As an example, consider the study by Szewczyk, Tsetsekos, and Zantout⁶ on dividend omissions. Figure 13.5 shows the plot of CARs for a sample of companies announcing dividend omissions. Since dividend omissions are generally considered to be bad events, we would expect abnormal returns to be negative around the time of the announcements. They are, as evidenced by a drop in the CAR on both the day before the announcement (day -1) and the day of the announcement (day 0).⁷ However, note that there is virtually no movement in the CARs in the days following the announcement. This implies that the bad news is fully incorporated into the stock price by the announcement day, a result consistent with market efficiency.

Over the years this type of methodology has been applied to a large number of events. Announcements of dividends, earnings, mergers, capital expenditures, and new issues of

⁶Samuel H. Szewczyk, George P. Tsetsekos, and Zaher Z. Zantout, "Do Dividend Omissions Signal Future Earnings or Past Earnings?" *Journal of Investing* (Spring 1997).

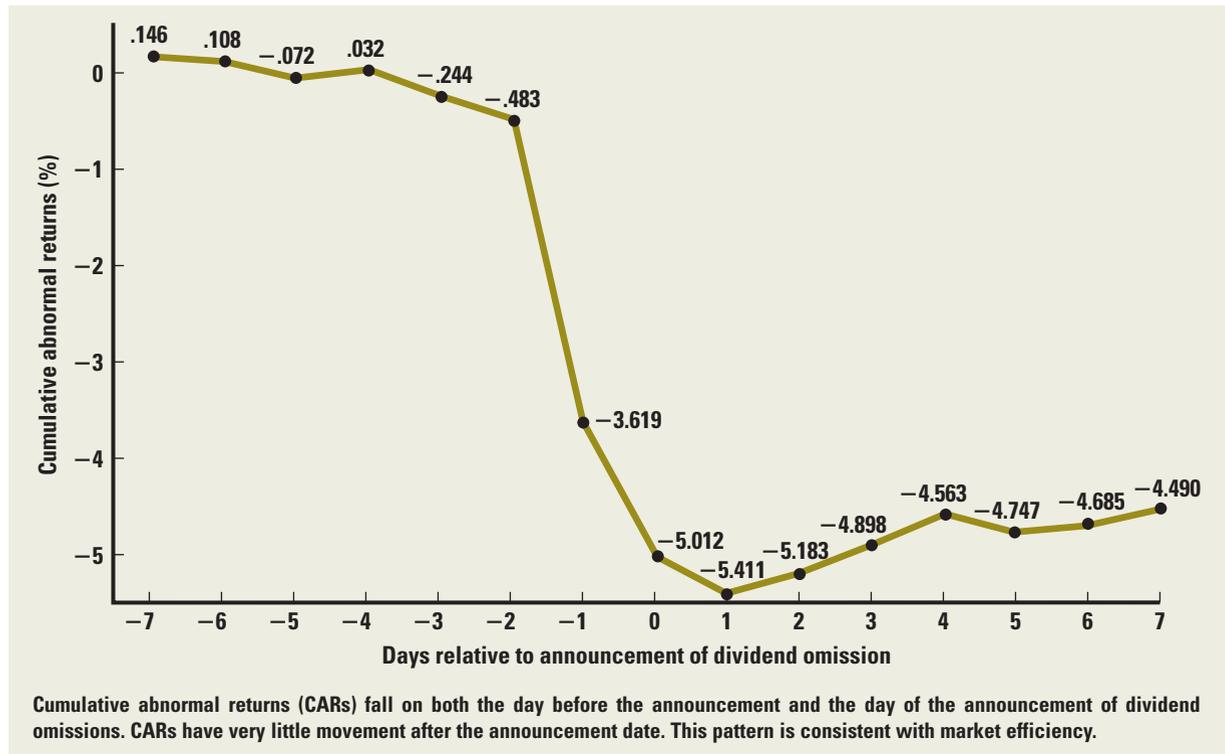
⁷An astute reader may wonder why the abnormal return is negative on day -1 , as well as on day 0 . To see why, first note that the announcement date is generally taken in academic studies to be the publication date of the story in *The Wall Street Journal* (*WSJ*). Then consider a company announcing a dividend omission via a press release at noon on Tuesday. The stock should fall on Tuesday. The announcement will be reported in the *WSJ* on Wednesday, because the Tuesday edition of the *WSJ* has already been printed. For this firm, the stock price falls on the day *before* the announcement in the *WSJ*.

Alternatively, imagine another firm announcing a dividend omission via a press release on Tuesday at 8 p.m. Since the stock market is closed at that late hour, the stock price will fall on Wednesday. Because the *WSJ* will report the announcement on Wednesday, the stock price falls on the day of the announcement in the *WSJ*.

Since firms may either make announcements during trading hours or after trading hours, stocks should fall on both day -1 and day 0 relative to publication in the *WSJ*.

FIGURE 13.5**Cumulative Abnormal Returns for Companies Announcing Dividend Omissions**

Source: From Exhibit 2 in S. H. Szewczyk, George P. Tsetsekos, and Zaher Z. Zantout, "Do Dividend Omissions Signal Future Earnings or Past Earnings?" *Journal of Investing* (Spring 1997).



stock are a few examples of the vast literature in the area. The early event study tests generally supported the view that the market is semistrong form (and therefore also weak form) efficient. However, a number of more recent studies present evidence that the market does not impound all relevant information immediately. Some conclude from this that the market is not efficient. Others argue that this conclusion is unwarranted, given statistical and methodological problems in the studies. This issue will be addressed in more detail later in the chapter.

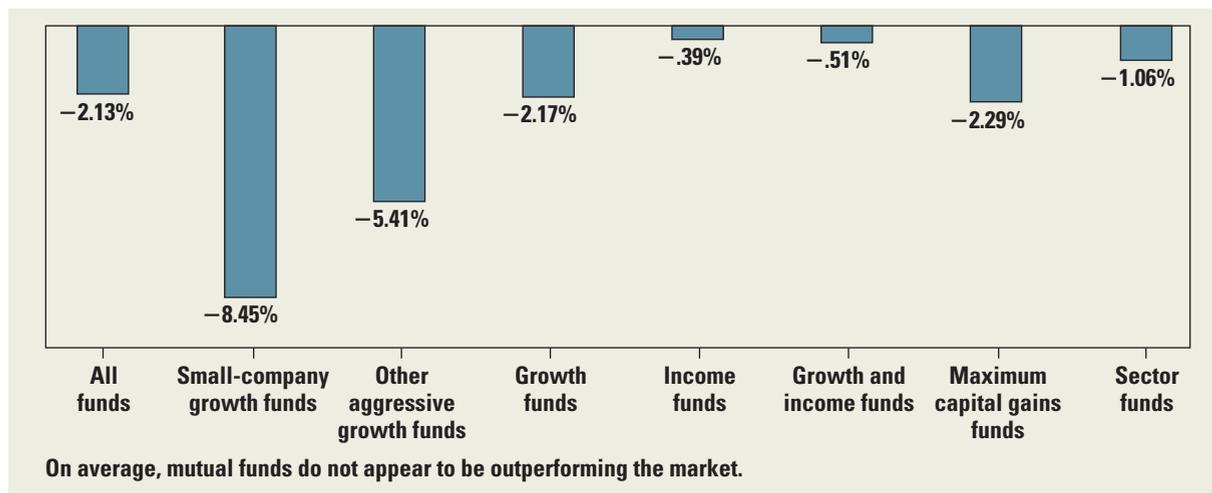
THE RECORD OF MUTUAL FUNDS If the market is efficient in the semistrong form, then no matter what publicly available information mutual fund managers rely on to pick stocks, their average returns should be the same as those of the average investor in the market as a whole. We can test efficiency, then, by comparing the performance of these professionals with that of a market index.

Consider Figure 13.6, which presents the performance of various types of mutual funds relative to the stock market as a whole. The far left of the figure shows that the universe of all funds covered in the study underperforms the market by 2.13 percent per year, after an appropriate adjustment for risk. Thus, rather than outperforming the market, the evidence shows underperformance. This underperformance holds for a number of types of funds as well. Returns in this study are net of fees, expenses, and commissions, so fund returns would be higher if these costs were added back. However, the study shows no evidence that funds, as a whole, are *beating* the market.

FIGURE 13.6

Annual Return Performance* of Different Types of U.S. Mutual Funds Relative to a Broad-Based Market Index (1963–1998)

Source: Taken from Table 2 of Lubos Pastor and Robert F. Stambaugh, "Mutual Fund Performance and Seemingly Unrelated Assets," *Journal of Financial Economics*, 63 (2002).



*Performance is relative to the market model.

Perhaps nothing rankles successful stock market investors more than to have some professor tell them that they are not necessarily smart, just lucky. However, while Figure 13.6 represents only one study, there have been many papers on mutual funds. The overwhelming evidence here is that mutual funds, on average, do not beat broad-based indexes.

By and large, mutual fund managers rely on publicly available information. Thus, the finding that they do not outperform market indexes is consistent with semistrong form and weak form efficiency.

However, this evidence does not imply that mutual funds are bad investments for individuals. Though these funds fail to achieve better returns than some indexes of the market, they do permit the investor to buy a portfolio that has a large number of stocks in it (the phrase “a well-diversified portfolio” is often used). They might also be very good at providing a variety of services such as keeping custody and records of all the stocks.

The Strong Form

Even the strongest adherents to the efficient market hypothesis would not be surprised to find that markets are inefficient in the strong form. After all, if an individual has information that no one else has, it is likely that she can profit from it.

One group of studies of strong form efficiency investigates insider trading. Insiders in firms have access to information that is not generally available. But if the strong form of the efficient market hypothesis holds, they should not be able to profit by trading on their information. A government agency, the Securities and Exchange Commission, requires insiders in companies to reveal any trading they might do in their own company’s stock. By examining the record of such trades, we can see whether they made abnormal returns. A number of studies support the view that these trades were abnormally profitable. Thus, strong form efficiency does not seem to be substantiated by the evidence.

13.5 THE BEHAVIORAL CHALLENGE TO MARKET EFFICIENCY

In Section 13.2, we presented Prof. Shleifer's three conditions, any one of which will lead to market efficiency. In that section, we made a case that at least one of the conditions is likely to hold in the real world. However, there is definitely disagreement here. Many members of the academic community (including Prof. Shleifer) argue that none of the three conditions are likely to hold in reality. This point of view is based on what is called *behavioral finance*. Let us examine the behavioral view on each of these three conditions.

RATIONALITY Are people really rational? Not always. Just travel to Atlantic City or Las Vegas to see people gambling, sometimes with large sums of money. The casino's take implies a negative expected return for the gambler. Since gambling is risky and has a negative expected return, it can never be on the efficient frontier of our Chapter 11. In addition, gamblers will often bet on black at a roulette table after black has occurred a number of consecutive times, thinking that the run will continue. This strategy is faulty, since roulette tables have no memory.

But, of course, gambling is only a sideshow as far as finance is concerned. Do we see irrationality in financial markets as well? The answer may very well be yes. Many investors do not achieve the degree of diversification that they should. Others trade frequently, generating both commissions and taxes. In fact, taxes can be handled optimally by selling losers and holding on to winners. While some individuals invest with tax minimization in mind, plenty of them do just the opposite. Many are more likely to sell their winners than their losers, a strategy leading to high tax payments. The behavioral view is not that *all* investors are irrational. Rather, it is that some, perhaps many, investors are.

INDEPENDENT DEVIATIONS FROM RATIONALITY Are deviations from rationality generally random, thereby likely to cancel out in a whole population of investors? To the contrary, psychologists have long argued that people deviate from rationality in accordance with a number of basic principles. While not all of these principles have an application to finance and market efficiency, at least two seem to do so.

The first principle, called *representativeness*, can be explained with the gambling example used above. The gambler believing a run of black will continue is in error since, in reality, the probability of a black spin is still only about 50 percent. Gamblers behaving in this way exhibit the psychological trait of representativeness. That is, they draw conclusions from too little data. In other words, the gambler believes the small sample he observed is more representative of the population than it really is.

How is this related to finance? Perhaps a market dominated by representativeness leads to bubbles. People see a sector of the market, for example, Internet stocks, having a short history of high revenue growth and extrapolate that it will continue forever. When the growth inevitably stalls, prices have nowhere to go but down.

The second principle is *conservatism*, which means that people are too slow in adjusting their beliefs to new information. Suppose that your goal since childhood was to become a dentist. Perhaps you came from a family of dentists, perhaps you liked the security and relatively high income that comes with that profession, or perhaps teeth always fascinated you. As things stand now, you could probably look forward to a long and productive career in that occupation. However, suppose that a new drug was developed that would prevent tooth decay. That drug would clearly reduce, or even eliminate, the demand for dentists. How quickly would you realize the implications as stated here? If you were emotionally attached to dentistry, you might adjust your beliefs very slowly. Family and friends could tell you to switch out of pre-dental courses in college, but you just might not be psychologically ready to do that. Instead, you might cling to your rosy view of dentistry's future.

Perhaps there is a relationship to finance here. For example, many studies report that prices seem to adjust slowly to the information contained in earnings announcements. Could it be that, because of conservatism, investors are slow in adjusting their beliefs to new information? More will be said on this in the next section.

ARBITRAGE In Section 13.2, we suggested that professional investors, knowing that securities are mispriced, could buy the underpriced ones while selling correctly priced (or even overpriced) substitutes. This might well undo any mispricing caused by emotional amateurs.

However, trading of this sort is likely to be more risky than it appears at first glance. Suppose professionals generally believed that McDonald's stock was underpriced. They would buy it, while selling their holdings in, say, Burger King and Wendy's. However, if amateurs were taking opposite positions, prices would adjust to correct levels only if the positions of amateurs were small relative to those of the professionals. In a world of many amateurs, a few professionals would have to take big positions to bring prices into line, perhaps even engaging heavily in short selling. Buying large amounts of one stock and short selling large amounts of other stocks is quite risky, even if the two stocks are in the same industry. Here, unanticipated bad news about McDonald's and unanticipated good news about the other two stocks would cause the professionals to register large losses.

In addition, if amateurs mispriced McDonald's today, what is to prevent McDonald's from being even *more* mispriced tomorrow? This risk of further mispricing, even in the presence of no new information, may also cause professionals to cut back their arbitrage positions. As an example, imagine a shrewd professional who believed Internet stocks were overpriced in 1998. Had he bet on a decline at that time, he would have lost in the near term, since prices rose through March of 2000. Yet, he would have eventually made money, since prices later fell. However, near-term risk may reduce the size of arbitrage strategies.

In conclusion, the arguments presented here suggest that the theoretical underpinnings of the efficient capital markets hypothesis, presented in Section 13.2, might not hold in reality. That is, investors may be irrational, irrationality may be related across investors rather than canceling out across investors, and arbitrage strategies may involve too much risk to eliminate market efficiencies.

13.6 EMPIRICAL CHALLENGES TO MARKET EFFICIENCY

Section 13.4 presented empirical evidence supportive of market efficiency. We now present evidence challenging this hypothesis. (Adherents of market efficiency generally refer to results of this type as *anomalies*.)

1. *Limits to Arbitrage*. Royal Dutch Petroleum and Shell Transport merged their interests in 1907, with all subsequent cash flows being split on a 60 percent—40 percent basis between the two companies. However, both companies continued to be publicly traded. One might imagine that the market value of Royal Dutch would always be 1.5 (60/40) times that of Shell. That is, if Royal Dutch ever became overpriced, rational investors would buy Shell instead of Royal Dutch. If Royal Dutch were underpriced, investors would buy Royal Dutch. In addition, arbitrageurs would go further by buying the underpriced security and selling the overpriced security short.

However, Figure 13.7 shows that Royal Dutch and Shell have rarely traded at parity over the 1962 to 2005 period (the companies discontinued separate trading in 2005). Why would these deviations occur? As stated in the previous section, behavioral finance suggests that there are limits to arbitrage. That is, an investor buying the overpriced asset and selling the underpriced asset does not have a

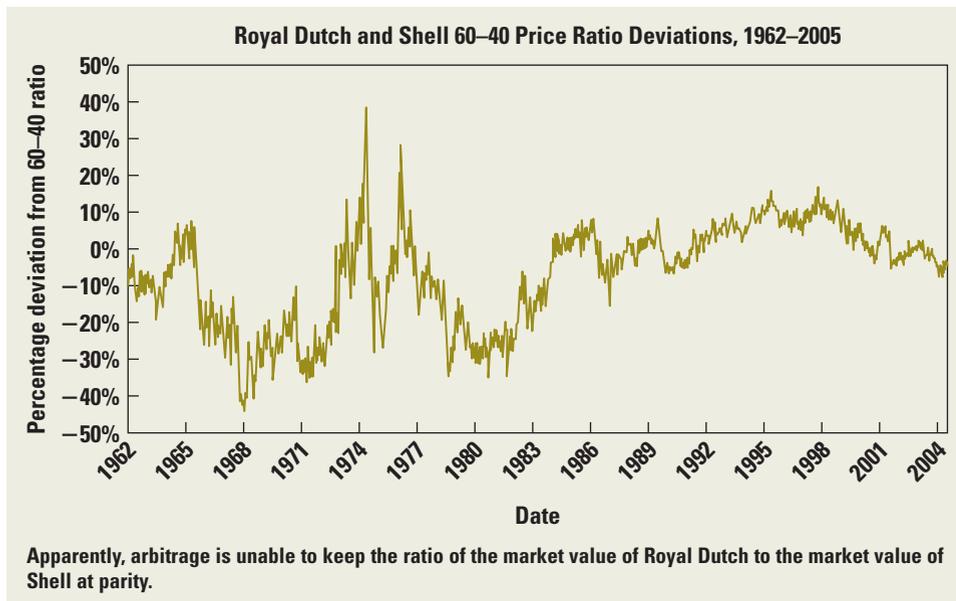


FIGURE 13.7
 Deviations of the Ratio of the Market Value of Royal Dutch to the Market Value of Shell from Parity
 Source: Author calculations.

sure thing. Deviations from parity could actually *increase* in the short run, implying losses for the arbitrageur. The well-known statement, “Markets can stay irrational longer than you can stay solvent,” attributed to John Maynard Keynes, applies here. Thus, risk considerations may force arbitrageurs to take positions that are too small to move prices back to parity. A nearby *The Real World* box discusses another recent example of relative mispricing between two stocks.

2. *Earnings Surprises.* Common sense suggests that prices should rise when earnings are reported to be higher than expected and prices should fall when the reverse occurs. However, market efficiency implies that prices will adjust immediately to the announcement, while behavioral finance would predict another pattern. Chan, Jegadeesh, and Lakonishok rank companies by the extent of their *earnings surprise*, that is, the difference between current quarterly earnings and quarterly earnings four quarters ago, divided by the standard deviation of quarterly earnings.⁸ They form a portfolio of companies with the most extreme positive surprises and another portfolio of companies with the most extreme negative surprises. Figure 13.8 shows returns from buying the two portfolios. As can be seen, prices adjust slowly to the earnings announcements, with the portfolio with the positive surprises outperforming the portfolio with the negative surprises over both the next six months and the next year. Many other researchers obtain similar results.

Why do prices adjust slowly? Behavioral finance suggests that investors exhibit conservatism here, as they are slow to adjust to the information contained in the announcements.

3. *Size.* In 1981, two important papers presented evidence that, in the United States, the returns on stocks with small market capitalizations were greater than the returns on stocks with large market capitalizations over most of the 20th century.⁹ The studies have since been replicated over different time periods and in different countries. For example, Figure 13.9 shows average annual returns over the period from 1963 to 1995 for five portfolios of U.S. stocks ranked on size.

⁸Louis K.C. Chan, Narasimhan Jegadeesh, and Josef Lakonishok, “Momentum Strategies,” *Journal of Finance* (December 1996).

⁹See R. W. Banz, “The Relationship between Return and Market Value of Common Stocks,” *Journal of Financial Economics* (March 1981), and M. R. Reinganum, “Misspecification of Capital Asset Pricing: Empirical Anomalies Based on Earnings Yields and Market Values,” *Journal of Financial Economics* (March 1981).

CAN STOCK MARKET INVESTORS ADD AND SUBTRACT?

On March 2, 2000, 3Com, a profitable provider of computer networking products and services, 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 (it has since been acquired by Hewlett-Packard).

3Com planned to distribute the remaining Palm shares to 3Com shareholders at a later date. Under the plan, if you owned one 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 indirectly by purchasing shares of 3Com and waiting.

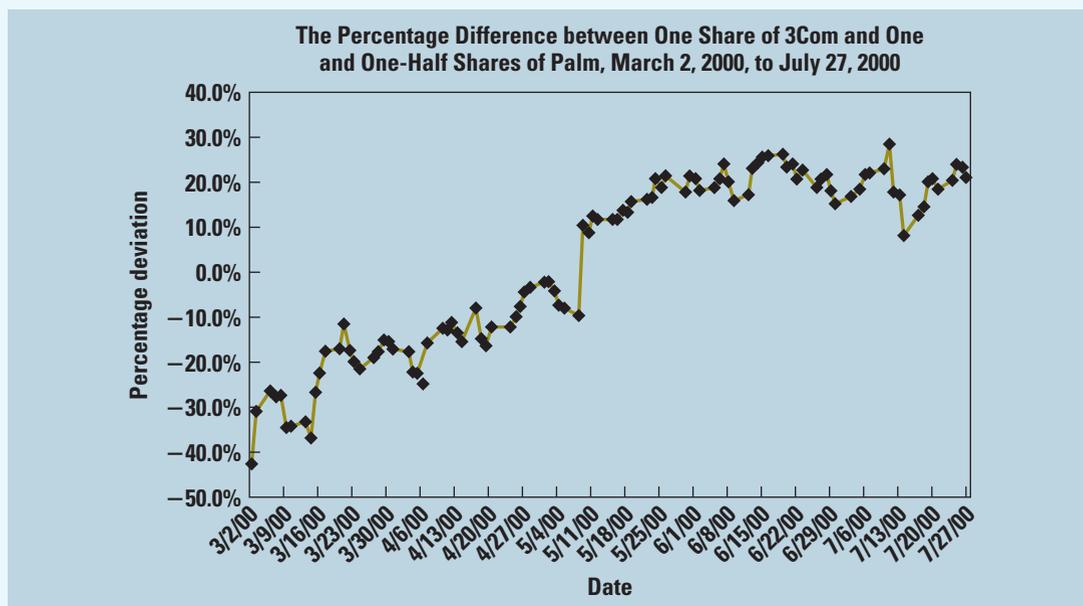
What makes this case interesting is what happened in the days that followed the Palm IPO. If you owned one 3Com share, you would be entitled, eventually, to 1.5 shares of Palm. Therefore, each 3Com share should be worth *at least* 1.5 times the value of each Palm share. We say at least, because the other 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 was selling for \$95.06 implies that the market valued the rest of 3Com's businesses (per share) at: $\$81.81 - 142.59 = -\60.78 . 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 sell shares of Palm. This trade is a no-brainer. In a well-functioning market, arbitrage traders would force the prices into alignment quite quickly. What happened?

As you can see in the accompanying figure, 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. Thus, the pricing error was corrected by market forces, but not instantly, which is consistent with the existence of limits to arbitrage.



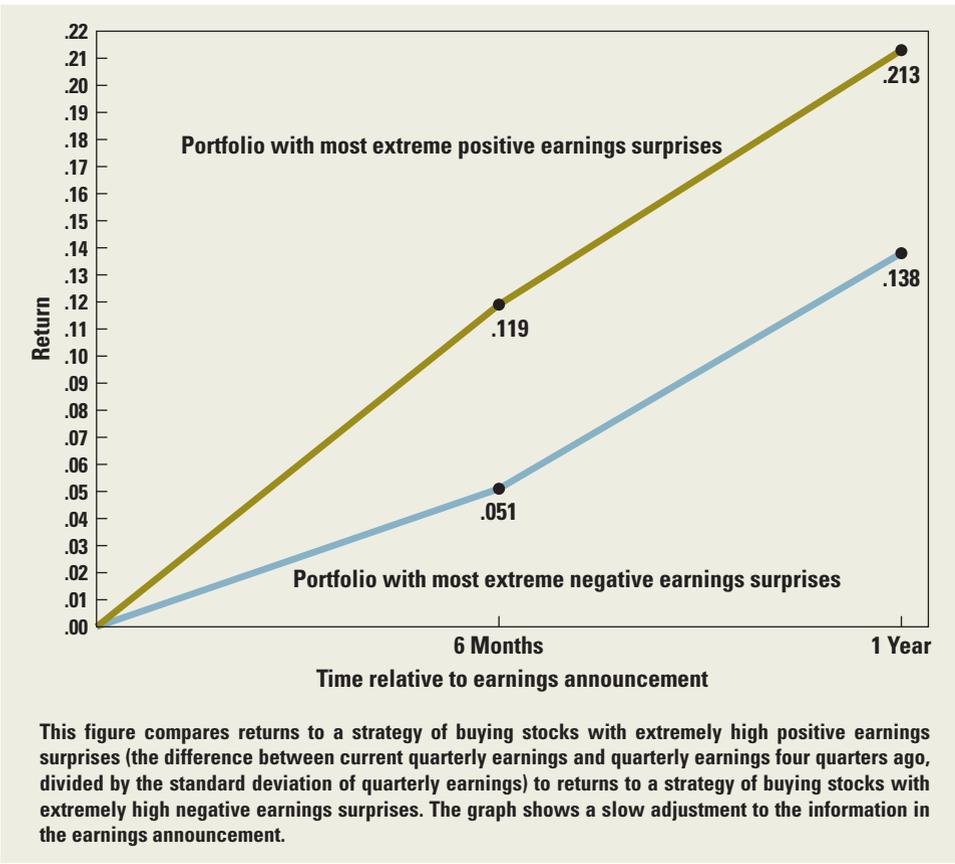


FIGURE 13.8

Returns to Two Investment Strategies Based on Earnings Surprise

Source: Adapted from Table III of L. K. C. Chan, N. Jegadeesh, and J. Lakonishok, "Momentum Strategies," *Journal of Finance* (December 1996).

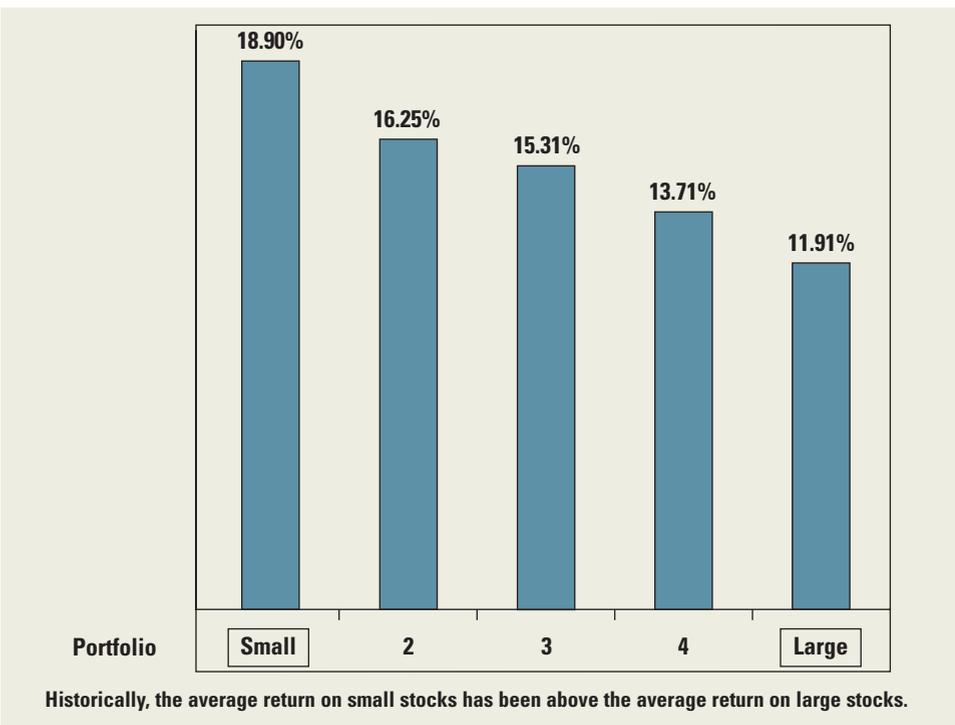


FIGURE 13.9

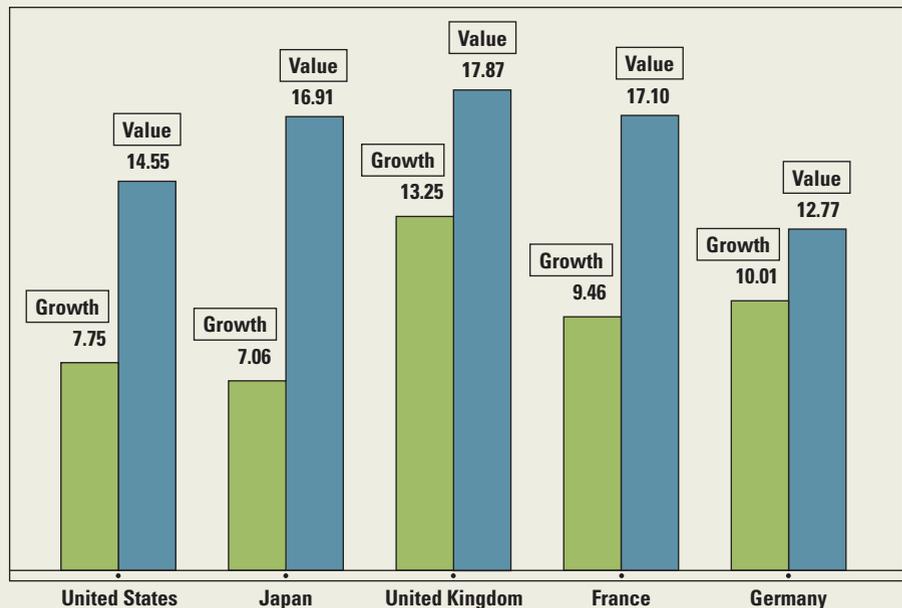
Annual Stock Returns on Portfolios Sorted by Size (Market Capitalization)

Source: Tim Loughran, "Book-to-Market across Firm Size, Exchange and Seasonality," *Journal of Financial and Quantitative Analysis* 32 (1997).

FIGURE 13.10

Annual U.S. Dollar Returns* (in percent) on Low Book-to-Price Firms and High Book-to-Price Firms in Selected Countries

Source: Eugene F. Fama and Kenneth R. French, "Value versus Growth: The International Evidence," *Journal of Finance* 53 (December 1998).



High book-to-price stocks (frequently called value stocks) outperform low book-to-price (growth) stocks in different countries.

* Returns are expressed as the excess over the return on U.S. Treasury bills.

As can be seen from Figure 13.9, the average annual return on small stocks is quite a bit higher than the average return on large stocks. Although much of the differential performance is merely compensation for the extra risk of small stocks, researchers have generally argued that not all of it can be explained by risk differences. In addition, Donald Keim presented evidence that most of the difference in performance occurs in the month of January.¹⁰

4. *Value versus Growth.* A number of papers have argued that stocks with high book-value-to-stock-price ratios and/or high earnings-to-price ratios (generally called *value stocks*) outperform stocks with low ratios (growth stocks). For example, Fama and French find that, for 12 of 13 major international stock markets, the average return on stocks with high book-value-to-stock-price ratios is above the average return on stocks with low book-value-to-stock-price ratios.¹¹ Figure 13.10 shows these returns for five large stock markets. Value stocks have outperformed growth stocks in each of these five markets.

Because the return difference is so large and because the above ratios can be obtained so easily for individual stocks, the results may constitute strong evidence against market efficiency. However, a number of papers suggest that the unusual returns are due to biases in the commercial databases or to differences in risk, not to a true inefficiency.¹² Since the debate revolves around arcane statistical issues,

¹⁰D. B. Keim, "Size-Related Anomalies and Stock Return Seasonality: Further Empirical Evidence," *Journal of Financial Economics* (June 1983).

¹¹Taken from Table III of Eugene F. Fama and Kenneth R. French, "Value versus Growth: The International Evidence," *Journal of Finance* 53 (December 1998).

¹²For example, see S. P. Kothari, J. Shanken, and R. G. Sloan, "Another Look at the Cross Section of Expected Stock Returns," *Journal of Finance* (March 1995), and E. F. Fama and K. R. French, "Multifactor Explanations of Asset Pricing Anomalies," *Journal of Finance* 51 (March 1996).



FIGURE 13.11

Value of Index of Internet Stocks

The index of Internet stocks rose over 10-fold from the beginning of 1996 to its high in March 2000 before falling to approximately its original level in 2002.

we will not pursue the issue further. However, it is safe to say that no conclusion is warranted at this time. As with so many other topics in finance and economics, further research is needed.

5. *Crashes and Bubbles.* The stock market crash of October 19, 1987, is extremely puzzling. The market dropped between 20 percent and 25 percent on a Monday following a weekend during which little surprising news was released. A drop of this magnitude for no apparent reason is not consistent with market efficiency. Because the crash of 1929 is still an enigma, it is doubtful that the more recent 1987 debacle will be explained anytime soon. The recent comments of an eminent historian are apt here: When asked what, in his opinion, the effect of the French Revolution of 1789 was, he replied that it was too early to tell.

Perhaps the two stock market crashes are evidence consistent with the **bubble theory** of speculative markets. That is, security prices sometimes move wildly above their true values. Eventually, prices fall back to their original level, causing great losses for investors. Consider, for example, the behavior of Internet stocks of the late 1990s. Figure 13.11 shows values of an index of Internet stocks from 1996 through 2002. The index rose over 10-fold from January 1996 to its high in March 2000, before retreating to approximately its original level in 2002. For comparison, the figure also shows price movement for the Standard & Poor's 500 Index. While this index rose and fell over the same period, the price movement was quite muted, relative to that of Internet stocks.¹³

Many commentators describe the rise and fall of Internet stocks as a *bubble*. Is it correct to do so? Unfortunately, there is no precise definition of the term. Some academics argue that the price movement in the figure is consistent with rationality. Prices rose initially, they say, because it appeared that the Internet would soon capture a large chunk of international commerce. Prices fell when later evidence suggested this would not occur quite so quickly. However, others argue that the initial rosy scenario was never supported by the facts. Rather, prices rose due to nothing more than “irrational exuberance.”

¹³More recently, many have suggested that the Standard & Poor's 500 Index experienced a bubble. It more than doubled in value from October 2002 to October 2007. But from November 2007 to March 2009, the index lost more than 50 percent of its value.

13.7 REVIEWING THE DIFFERENCES

It is fair to say that the controversy over efficient capital markets has yet to be resolved. Rather, academic financial economists have sorted themselves into three camps, with some adhering to market efficiency, some believing in behavioral finance, and others (perhaps the majority) not yet convinced that either side has won the argument. This state of affairs is certainly different from, say, 20 years ago, when market efficiency went unchallenged. In addition, the controversy here is perhaps the most contentious of any area of financial economics. Only in this area do grown-up finance professors come close to fisticuffs over an idea.

Because of the controversy, it does not appear that our textbook, or any textbook, can easily resolve the differing points of view. However, we can illustrate the differences between the two camps by relating the two psychological principles mentioned earlier, representativeness and conservatism, to stock returns.

Representativeness

This principle implies overweighting the results of small samples, as with the gambler who thinks a few consecutive spins of black on the roulette wheel make black a more likely outcome than red on the next spin. Financial economists have argued that representativeness leads to *overreaction* in stock returns. We mentioned earlier that financial bubbles are likely overreactions to news. Internet companies showed great revenue growth for a short time in the late 1990s, causing many to believe that this growth would continue indefinitely. Stock prices rose (too much) at this point. When, at last, investors realized that this growth could not be sustained, prices plummeted.

Conservatism

This principle states that individuals adjust their beliefs too slowly to new information. A market composed of this type of investor would likely lead to stock prices that *underreact* in the presence of new information. The example concerning earnings surprises may well illustrate this underreaction. Prices rose slowly following announcements of positive earnings surprises. Announcements of negative surprises had a similar, but opposite, reaction.

The two academic camps have different views of these results. The efficient market believers stress that representativeness and conservatism have opposite implications for stock prices. Which principle, they ask, should dominate in any particular situation? In other words, why should investors overreact to news about Internet stocks but underreact to earnings news? Fama reviews the academic studies on anomalies, finding that about half of them show overreaction and about half show underreaction.¹⁴ He concludes that this evidence is consistent with the market efficiency hypothesis that anomalies are chance events. In addition, he argues that behavioral finance must do better at specifying which types of information should lead to overreaction and which to underreaction before one rejects market efficiency in favor of behavioral finance.

Adherents of behavioral finance see things a little differently. First, they point out that, as discussed in Section 13.5, the three theoretical foundations of market efficiency appear to be violated in the real world. Second, there are simply too many anomalies, with a number of them being replicated in out-of-sample tests. This argues against anomalies being mere chance events. Finally, though the field has not yet determined why either overreaction or underreaction should dominate in a particular situation, much progress has already been made in a short period of time.

¹⁴Eugene F. Fama, "Market Efficiency, Long-Term Returns and Behavioral Finance," *Journal of Financial Economics* 49 (September 1998).

13.8 IMPLICATIONS FOR CORPORATE FINANCE

So far, the chapter has examined both theoretical arguments and empirical evidence concerning efficient markets. We now ask the question: Does market efficiency have any relevance for corporate financial managers? The answer is that it does. Below we consider four implications of efficiency for managers.

1. Accounting Choices, Financial Choices, and Market Efficiency

The accounting profession provides firms with a significant amount of leeway in their reporting practices. For example, companies may choose between the last-in, first-out (LIFO) or the first-in, first-out (FIFO) method in valuing inventories. They may choose either the percentage-of-completion or the completed-contract method for construction projects. They may depreciate physical assets by either accelerated or straight-line depreciation.

Managers clearly prefer high stock prices to low stock prices. Should managers use the leeway in accounting choices to report the highest possible income? Not necessarily, if markets are efficient. That is, accounting choice should not affect stock price if two conditions hold. First, enough information must be provided in the annual report so that financial analysts can construct earnings under the alternative accounting methods. This appears to be the case for many, though not necessarily all, accounting choices. Second, the market must be efficient in the semistrong form. In other words, the market must appropriately use all of this accounting information in determining the market price.

Of course, the issue of whether accounting choice affects stock price is ultimately an empirical matter. A number of academic papers have addressed this issue, and the evidence does not suggest that managers can boost stock price through accounting practices. In other words, the market appears efficient enough to see through different accounting choices.

One caveat is called for here. Our discussion specifically assumed that “financial analysts can construct earnings under the alternative accounting methods.” However, companies like Enron, WorldCom, Global Crossing, and Xerox simply reported fraudulent numbers in recent years. There was no way for financial analysts to construct alternative earnings numbers, since these analysts were unaware how the reported numbers were determined. So it was not surprising that the prices of these stocks initially rose well above fair value. Yes, managers can boost prices in this way—as long as they are willing to serve time once they are caught!

Is there anything else that investors can be expected to see through in an efficient market? Consider stock splits and stock dividends. Today Amarillo Corporation has 1 million shares outstanding and reports \$10 million of earnings. In the hopes of boosting its stock price, the firm’s chief financial officer (CFO), Ms. Green, recommends to the board of directors that Amarillo have a 2-for-1 stock split. That is, a shareholder with 100 shares prior to the split would have 200 shares after the split. The CFO contends that each investor would feel richer after the split because he would own more shares.

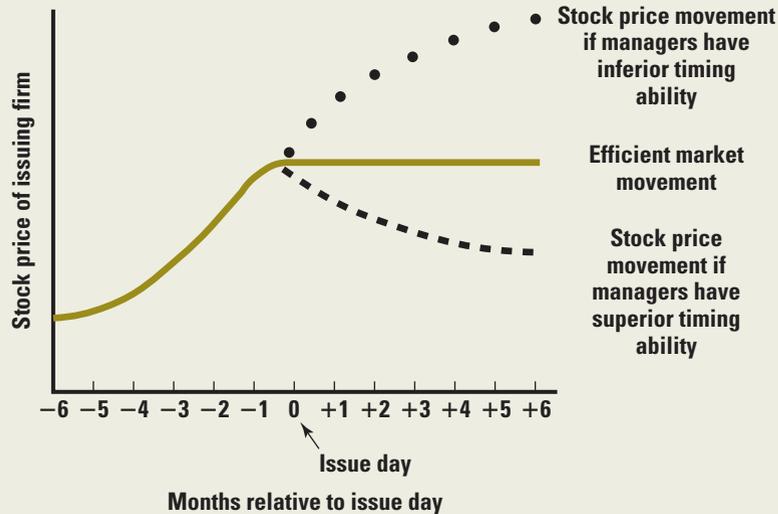
However, this thinking runs counter to market efficiency. A rational investor knows that he would own the same proportion of the firm after the split as before the split. For example, our investor with 100 shares owns $1/10,000$ ($= 100/1$ million) of Amarillo’s shares prior to the split. His share of the earnings would be \$1,000 ($= \10 million/ $10,000$). While he would own 200 shares after the split, there would now be 2 million shares outstanding. Thus, he still would own $1/10,000$ of the firm. His share of the earnings would still be \$1,000, since the stock split would not affect the earnings of the entire firm.

2. The Timing Decision

Imagine a firm whose managers are contemplating the date to issue equity. This decision is frequently called the *timing* decision. If managers believe that their stock is overpriced, they are likely to issue equity immediately. Here, they are creating value for their current

FIGURE 13.12

Three Stock Price Adjustments after Issuing Equity



Studies show that stock is more likely to be issued after stock prices have increased. No inferences on market efficiency can be drawn from this result. Rather, market efficiency implies that the stock price of the issuing firm, on average, neither rises nor falls (relative to stock market indexes) after issuance of stock.

stockholders because they are selling stock for more than it is worth. Conversely, if the managers believe that their stock is underpriced, they are more likely to wait, hoping that the stock price will eventually rise to its true value.

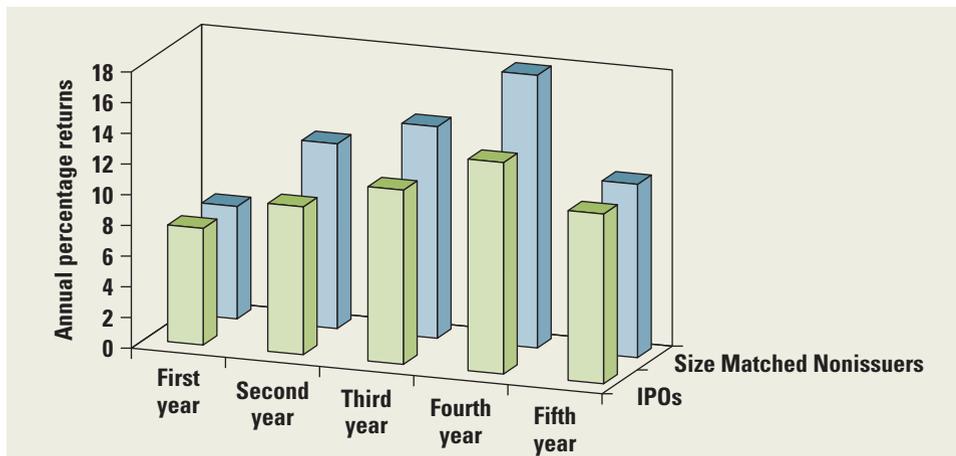
However, if markets are efficient, securities are always correctly priced. Since efficiency implies that stock is sold for its true worth, the timing decision becomes unimportant. Figure 13.12 shows three possible stock price adjustments to the issuance of new stock.

Of course, market efficiency is ultimately an empirical issue. Surprisingly, recent research has called market efficiency into question. Ritter presents evidence that the annual returns over the five years following an initial public offering (IPO) are about 2 percent less for the issuing company than the returns on a nonissuing company of similar book-to-market ratio.¹⁵ Annual returns over this period following a seasoned equity offering (SEO) are between 3 percent and 4 percent less for the issuing company than for a comparable nonissuing company. A company's first public offering is called an IPO and all subsequent offerings are termed SEOs. The upper half of Figure 13.13 shows average annual returns of both IPOs and their control group, and the lower half of the figure shows average annual returns of both SEOs and their control group.

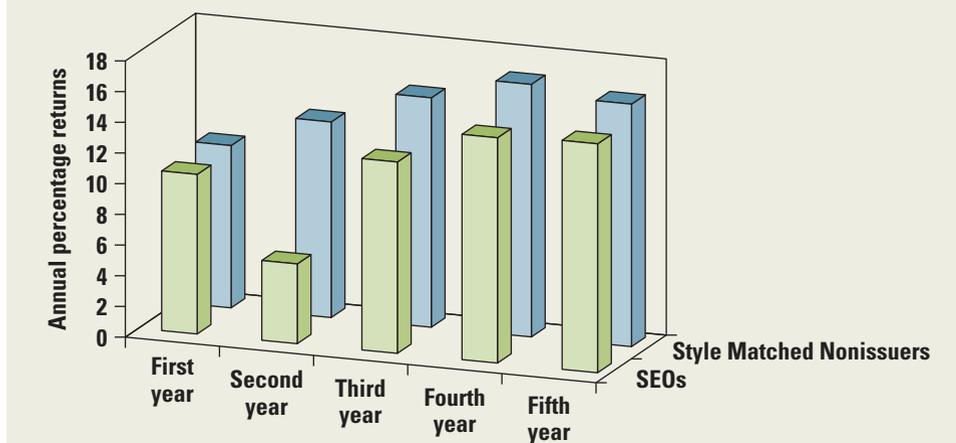
The evidence in Ritter's paper suggests that corporate managers issue SEOs when the company's stock is overpriced. In other words, managers appear to time the market successfully. The evidence that managers time their IPOs is less compelling, since returns following IPOs are closer to those of their control group.

Does the ability of a corporate official to issue an SEO when the security is overpriced indicate that the market is inefficient in the semistrong form or the strong form? The answer is actually somewhat more complex than it may first appear. On one hand, officials are likely to have special information that the rest of us do not have, suggesting that the market need only be inefficient in the strong form. On the other hand, if the market were truly semistrong efficient, the price would drop immediately and completely upon the announcement of an upcoming SEO. That is, rational investors would realize that stock is being

¹⁵Jay Ritter, "Investment Banking and Security Issuance," Chapter 5 of *Handbook of the Economics of Finance*, ed. George Constantinides, Milton Harris, and Rene Stulz, North Holland: Amsterdam, 2003.



The average raw returns for 7,042 IPOs from 1970–2000 and their matching nonissuing firms during the five years after the issue. The first-year return does not include the return on the day of issue.



The average raw returns for 7,502 SEOs from 1970–2000 and their matching nonissuing firms during the five years after the issue. The first-year return does not include the return on the day of issue. On average, IPOs underperform their control groups by about 2% per year in the five years following issuance. SEOs underperform by about 3%–4% per year.

FIGURE 13.13

Returns on Initial Public Offerings (IPOs) and Seasoned Equity Offerings (SEOs) in Years Following Issue

Source: Jay Ritter, "Investment Banking and Security Issuance," Chapter 5 of *Handbook of the Economics of Finance*, ed. George Constantinides, Milton Harris, and Rene Stulz, North Holland: Amsterdam, 2003.

issued because corporate officials have special information that the stock is overpriced. Indeed, many empirical studies report a price drop on the announcement date. However, Figure 13.13 indicates that there is a further price drop in the subsequent years, suggesting that the market is inefficient in the semistrong form.

If firms can time the issuance of common stock, perhaps they can also time the repurchase of stock. Here, a firm would like to repurchase when its stock is undervalued. Ikenberry, Lakonishok, and Vermaelen find that stock returns of repurchasing firms are abnormally high in the two years following repurchase, suggesting that timing is effective here.¹⁶

As is always the case, empirical research is never ultimately settled. However, in our opinion, the evidence strongly suggests that managers successfully engage in timing. If this conclusion stands the test of time, it would constitute evidence against market efficiency.

¹⁶D. Ikenberry, J. Lakonishok, and T. Vermaelen, "Market Underreaction to Open Market Share Repurchases," *Journal of Financial Economics* (October–November 1995).

3. Speculation and Efficient Markets

We normally think of individuals and financial institutions as the primary speculators in financial markets. However, industrial corporations speculate as well. For example, many companies make interest rate bets. If the managers of a firm believe that interest rates are likely to rise, they have an incentive to borrow, because the present value of the liability will fall with the rate increase. In addition, these managers will have an incentive to borrow long term rather than short term in order to lock in the low rates for a longer period of time. The thinking can get more sophisticated. Suppose that the long-term rate is already higher than the short-term rate. The manager might argue that this differential reflects the market's view that rates will rise. However, perhaps he anticipates a rate increase even greater than what the market anticipates, as implied by the upward-sloping term structure. Again, the manager will want to borrow long term rather than short term.

Firms also speculate in foreign currencies. Suppose that the CFO of a multinational corporation based in the United States believes that the euro will decline relative to the dollar. He would probably issue euro-denominated debt rather than dollar-denominated debt, since he expects the value of the foreign liability to fall. Conversely, he would issue debt domestically if he believes foreign currencies will appreciate relative to the dollar.

We are perhaps getting a little ahead of our story, since the subtleties of the term structure and exchange rates are treated in other chapters, not this one. However, the big picture question is this: What does market efficiency have to say about the above activity? The answer is quite clear. If financial markets are efficient, managers should not waste their time trying to forecast the movements of interest rates and foreign currencies. Their forecasts will likely be no better than chance. And they will be using up valuable executive time. This is not to say, however, that firms should flippantly pick the maturity or the denomination of their debt in a random fashion. A firm must *choose* these parameters carefully. However, the choice should be based on other rationales, not on an attempt to beat the market. For example, a firm with a project lasting five years might decide to issue five-year debt. A firm might issue yen-denominated debt, because it anticipates expanding into Japan in a big way.

The same thinking applies to acquisitions. Many corporations buy up other firms because they think these targets are underpriced. Unfortunately, the empirical evidence suggests that the market is too efficient for this type of speculation to be profitable. And the acquirer never pays just the current market price. The bidding firm must pay a premium above market to induce a majority of shareholders of the target firm to sell their shares. However, this is not to say that firms should never be acquired. Rather, one should consider an acquisition if there are benefits, that is, synergies, from the union. Improved marketing, economies in production, replacement of bad management, and even tax reduction are typical synergies. These synergies are distinct from the perception that the acquired firm is underpriced.

One caveat should be mentioned. We talked earlier about empirical evidence suggesting that SEOs are timed to take advantage of overpriced stock. This makes sense, since managers are likely to know more about their own firm than the market does. However, while managers may very well have special information about their own firm, it is unlikely that they have special information about interest rates, foreign currencies, and other firms. There are simply too many participants in these markets, many of whom are devoting all of their time to forecasting. Managers typically spend most of their time running their own firms, with only a small amount devoted to studying financial markets.

4. Information in Market Prices

The previous section argued that it is quite difficult to forecast future market prices. However, the current and past prices of any asset are known—and of great use. Consider, for example, Becher's study of bank mergers.¹⁷ The author finds that stock prices of acquired

¹⁷David A. Becher, "The Valuation Effects of Bank Mergers," *Journal of Corporate Finance* 6 (2000).

banks rise about 23 percent on average upon the first announcement of a merger. This is not surprising, since companies are generally bought out at a premium above current stock price. However, the same study shows that prices of acquiring banks fall almost 5 percent on average upon the same announcement. This is pretty strong evidence that bank mergers do not benefit, and may even hurt, acquiring companies. The reason for this result is unclear, though perhaps acquirers simply overpay for acquisitions. Regardless of the reason, the *implication* is clear. A bank should think deeply before making an acquisition of another bank.

Furthermore, suppose you are the CFO of a company whose stock price drops much more than 5 percent upon announcement of an acquisition. The market is telling you that the merger is quite bad for your firm. Serious consideration should be given to canceling the merger, even if, prior to the announcement, you thought the merger was a good idea.

Of course, mergers are only one type of corporate event. Managers should pay attention to the stock price reaction to any of their announcements, whether it concerns a new venture, a divestiture, a restructuring, or something else.

This is not the only way in which corporations can use the information in market prices. Suppose you are on the board of directors of a company whose stock price has declined precipitously since the current chief executive officer (CEO) was hired. In addition, the prices of competitors have risen over the same time. Though there may be extenuating circumstances, this can be viewed as evidence that the CEO is doing a poor job. Perhaps he should be fired. If this seems harsh, consider that Warner, Watts, and Wruck find a strong negative correlation between managerial turnover and prior stock performance.¹⁸ Figure 13.14 shows that stocks fall on average about 40 percent in price (relative to market movements) in the three years prior to the forced departure of a top manager.

If managers are fired for bad stock price performance, perhaps they are rewarded for stock price appreciation. Hall and Liebman state:

Our main empirical finding is that CEO wealth often changes by millions of dollars for typical changes in firm value. For example, the median total compensation for CEOs is about \$1 million if their firm's stock has a 30th percentile annual return (-7.0 percent) and is \$5 million if the firm's stock has a 70th percentile annual return (20.5 percent). Thus, there is a difference

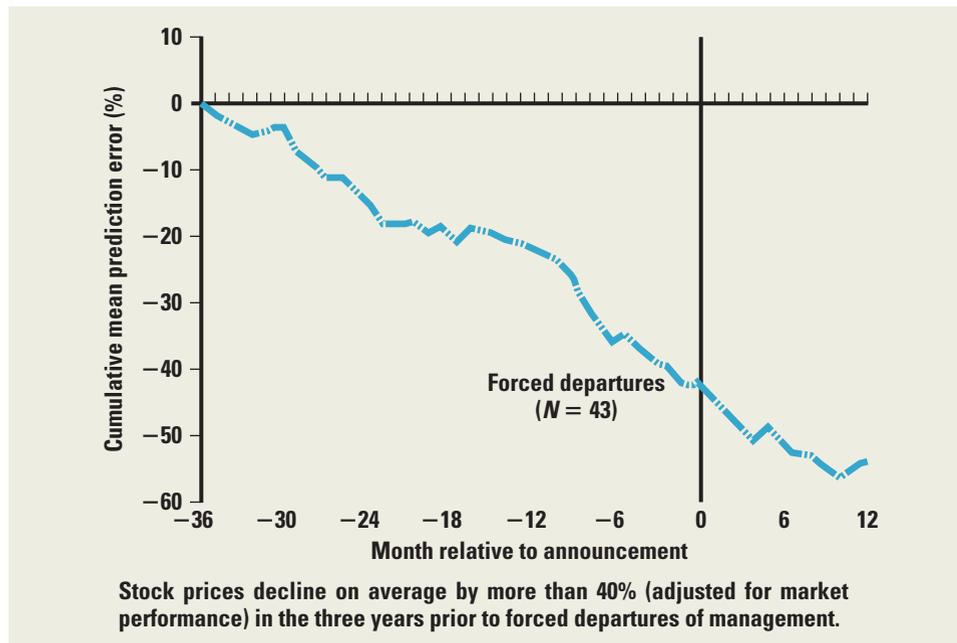


FIGURE 13.14

Stock Performance Prior to Forced Departures of Management

Source: Adapted from Figure 1 of Warner, Watts, and Wruck, "Stock Prices and Top Management Changes," *Journal of Financial Economics* 20 (1988).

¹⁸Jerold B. Warner, Ross L. Watts, and Karen H. Wruck, "Stock Prices and Top Management Changes," *Journal of Financial Economics* 20 (1988).

of about \$4 million in compensation for achieving a moderately above average performance relative to a moderately below average performance.¹⁹

Market efficiency implies that stock prices reflect all available information. We recommend using this information as much as possible in corporate decisions. And, at least with respect to executive firings and executive compensation, it looks as if real-world corporations do pay attention to market prices. The following box summarizes some key issues in the efficient markets debate.

EFFICIENT MARKET HYPOTHESIS: A SUMMARY

Does Not Say

- Prices are uncaused.
- Investors are foolish and too stupid to be in the market.
- All shares of stock have the same expected returns.
- Investors should throw darts to select stocks.
- There is no upward trend in stock prices.

Does Say

- Prices reflect underlying value.
- Financial managers cannot time stock and bond sales.
- Managers cannot profitably speculate in foreign currencies.
- Managers cannot boost stock prices through creative accounting.

Why Doesn't Everybody Believe It?

- There are optical illusions, mirages, and apparent patterns in charts of stock market returns.
- The truth is less interesting.
- There is evidence against efficiency:
 - Two different, but financially identical, classes of stock of same firm selling at different prices.
 - Earnings surprises.
 - Small versus large stocks.
 - Value versus growth stocks.
 - Crashes and bubbles.

Three Forms

Weak form: Current prices reflect past prices; chartism (technical analysis) is useless.

Semistrong form: Prices reflect all public information; most financial analysis is useless.

Strong form: Prices reflect all that is knowable; nobody consistently makes superior profits.

¹⁹Brian J. Hall and Jeffrey B. Liebman, "Are CEOs Really Paid Like Bureaucrats?" *Quarterly Journal of Economics* (August 1998), p. 854.

SUMMARY AND CONCLUSIONS

1. An efficient financial market processes the information available to investors and incorporates it into the prices of securities. Market efficiency has two general implications. First, in any given time period, a stock's abnormal return depends on information or news received by the market in that period. Second, an investor who uses the same information as the market cannot expect to earn abnormal returns. In other words, systems for playing the market are doomed to fail.

2. What information does the market use to determine prices? The weak form of the efficient market hypothesis says that the market uses the past history of prices and is therefore efficient with respect to these past prices. This implies that stock selection based on patterns of past stock price movements is no better than random stock selection.
3. The semistrong form states that the market uses all publicly available information in setting prices.
4. Strong form efficiency states that the market uses all of the information that anybody knows about stocks, even inside information.
5. Much evidence from different financial markets supports weak form and semistrong form efficiency but not strong form efficiency.
6. Behavioral finance states that the market is not efficient. Adherents argue that:
 - a. Investors are not rational.
 - b. Deviations from rationality are similar across investors.
 - c. Arbitrage, being costly, will not eliminate inefficiencies.
7. Behaviorists point to many studies, including those showing that small stocks outperform large stocks, value stocks outperform growth stocks, and stock prices adjust slowly to earnings surprises, as empirical confirmation of their beliefs.
8. Four implications of market efficiency for corporate finance are:
 - a. Managers cannot fool the market through creative accounting.
 - b. Firms cannot successfully time issues of debt and equity.
 - c. Managers cannot profitably speculate in foreign currencies and other instruments.
 - d. Managers can reap many benefits by paying attention to market prices.

CONCEPT QUESTIONS

1. **Firm Value** What rule should a firm follow when making financing decisions? How can firms create valuable financing opportunities?
2. **Efficient Market Hypothesis** Define the three forms of market efficiency.
3. **Efficient Market Hypothesis** Which of the following statements are true about the efficient market hypothesis?
 - a. It implies perfect forecasting ability.
 - b. It implies that prices reflect all available information.
 - c. It implies an irrational market.
 - d. It implies that prices do not fluctuate.
 - e. It results from keen competition among investors.
4. **Market Efficiency Implications** Explain why a characteristic of an efficient market is that investments in that market have zero NPVs.
5. **Efficient Market Hypothesis** A stock market analyst is able to identify mispriced stocks by comparing the average price for the last 10 days to the average price for the last 60 days. If this is true, what do you know about the market?
6. **Semistrong Efficiency** If a market is semistrong form efficient, is it also weak form efficient? Explain.
7. **Efficient Market Hypothesis** What are the implications of the efficient market hypothesis for investors who buy and sell stocks in an attempt to “beat the market”?

- 8. Stocks versus Gambling** Critically evaluate the following statement: Playing the stock market is like gambling. Such speculative investing has no social value, other than the pleasure people get from this form of gambling.
- 9. Efficient Market Hypothesis** There are several celebrated investors and stock pickers frequently mentioned in the financial press who have recorded huge returns on their investments over the past two decades. Is the success of these particular investors an invalidation of the EMH? Explain.
- 10. Efficient Market Hypothesis** For each of the following scenarios, discuss whether profit opportunities exist from trading in the stock of the firm under the conditions that (1) the market is not weak form efficient, (2) the market is weak form but not semistrong form efficient, (3) the market is semistrong form but not strong form efficient, and (4) the market is strong form efficient.
- The stock price has risen steadily each day for the past 30 days.
 - The financial statements for a company were released three days ago, and you believe you've uncovered some anomalies in the company's inventory and cost control reporting techniques that are causing the firm's true liquidity strength to be understated.
 - You observe that the senior management of a company has been buying a lot of the company's stock on the open market over the past week.

Use the following information for the next two questions:

Technical analysis is a controversial investment practice. Technical analysis covers a wide array of techniques, which are all used in an attempt to predict the direction of a particular stock, or the market. Technical analysts look at two major types of information: historical stock prices and investor sentiment. A technical analyst would argue these two information sets provide information on the future direction of a particular stock, or the market as a whole.

- 11. Technical Analysis** What would a technical analyst say about market efficiency?
- 12. Investor Sentiment** A technical analysis tool that is sometimes used to predict market movements is an investor sentiment index. AAll, the American Association of Individual Investors, publishes an investor sentiment index based on a survey of its members. In the table below you will find the percentage of investors who were bullish, bearish, or neutral during a four-week period.

WEEK	BULLISH	BEARISH	NEUTRAL
1	37%	25%	38%
2	52	14	34
3	29	35	36
4	43	26	31

What is the investor sentiment index intended to capture? How might it be useful in technical analysis?

- 13. Performance of the Pros** In the mid- to late-1990s, the performance of the pros was unusually poor—on the order of 90 percent of all equity mutual funds underperformed a passively managed index fund. How does this bear on the issue of market efficiency?
- 14. Efficient Markets** A hundred years ago or so, companies did not compile annual reports. Even if you owned stock in a particular company, you were unlikely to be allowed to see the balance sheet and income statement for the company. Assuming the market is semistrong form efficient, what does this say about market efficiency then compared to now?
- 15. Efficient Market Hypothesis** Aerotech, an aerospace technology research firm, announced this morning that it has hired the world's most knowledgeable and prolific space researchers.

Before today, Aerotech's stock had been selling for \$100. Assume that no other information is received over the next week and the stock market as a whole does not move.

- a. What do you expect will happen to Aerotech's stock?
- b. Consider the following scenarios:
 - i. The stock price jumps to \$118 on the day of the announcement. In subsequent days it floats up to \$123, then falls back to \$116.
 - ii. The stock price jumps to \$116 and remains at that level.
 - iii. The stock price gradually climbs to \$116 over the next week.

Which scenario(s) indicates market efficiency? Which one(s) does not? Why?

16. **Efficient Market Hypothesis** When the 56-year-old founder of Gulf & Western, Inc., died of a heart attack, the stock price immediately jumped from \$18.00 a share to \$20.25, a 12.5 percent increase. This is evidence of market inefficiency, because an efficient stock market would have anticipated his death and adjusted the price beforehand. Assume that no other information is received and the stock market as a whole does not move. Is this statement about market efficiency true or false? Explain.
17. **Efficient Market Hypothesis** Today, the following announcement was made: "Early today the Justice Department reached a decision in the Universal Product Care (UPC) case. UPC has been found guilty of discriminatory practices in hiring. For the next five years, UPC must pay \$2 million each year to a fund representing victims of UPC's policies." Assuming the market is efficient, should investors not buy UPC stock after the announcement because the litigation will cause an abnormally low rate of return? Explain.
18. **Efficient Market Hypothesis** Newtech Corp. is going to adopt a new chip-testing device that can greatly improve its production efficiency. Do you think the lead engineer can profit from purchasing the firm's stock before the news release on the device? After reading the announcement in *The Wall Street Journal*, should you be able to earn an abnormal return from purchasing the stock if the market is efficient?
19. **Efficient Market Hypothesis** TransTrust Corp. has changed how it accounts for inventory. Taxes are unaffected, although the resulting earnings report released this quarter is 20 percent higher than what it would have been under the old accounting system. There is no other surprise in the earnings report and the change in the accounting treatment was publicly announced. If the market is efficient, will the stock price be higher when the market learns that the reported earnings are higher?
20. **Efficient Market Hypothesis** The Durkin Investing Agency has been the best stock picker in the country for the past two years. Before this rise to fame occurred, the Durkin newsletter had 200 subscribers. Those subscribers beat the market consistently, earning substantially higher returns after adjustment for risk and transaction costs. Subscriptions have skyrocketed to 10,000. Now, when the Durkin Investing Agency recommends a stock, the price instantly rises several points. The subscribers currently earn only a normal return when they buy recommended stock because the price rises before anybody can act on the information. Briefly explain this phenomenon. Is Durkin's ability to pick stocks consistent with market efficiency?
21. **Efficient Market Hypothesis** Your broker commented that well-managed firms are better investments than poorly managed firms. As evidence, your broker cited a recent study examining 100 small manufacturing firms that eight years earlier had been listed in an industry magazine as the best-managed small manufacturers in the country. In the ensuing eight years, the 100 firms listed have not earned more than the normal market return. Your broker continued to say that if the firms were well managed, they should have produced better-than-average returns. If the market is efficient, do you agree with your broker?

- 22. Efficient Market Hypothesis** A famous economist just announced in *The Wall Street Journal* his findings that the recession is over and the economy is again entering an expansion. Assume market efficiency. Can you profit from investing in the stock market after you read this announcement?
- 23. Efficient Market Hypothesis** Suppose the market is semistrong form efficient. Can you expect to earn excess returns if you make trades based on:
- Your broker's information about record earnings for a stock?
 - Rumors about a merger of a firm?
 - Yesterday's announcement of a successful new product test?
- 24. Efficient Market Hypothesis** Imagine that a particular macroeconomic variable that influences your firm's net earnings is positively serially correlated. Assume market efficiency. Would you expect price changes in your stock to be serially correlated? Why or why not?
- 25. Efficient Market Hypothesis** The efficient market hypothesis implies that all mutual funds should obtain the same expected risk-adjusted returns. Therefore, we can simply pick mutual funds at random. Is this statement true or false? Explain.
- 26. Efficient Market Hypothesis** Assume that markets are efficient. During a trading day, American Golf Inc. announces that it has lost a contract for a large golfing project, which, prior to the news, it was widely believed to have secured. If the market is efficient, how should the stock price react to this information if no additional information is released?
- 27. Efficient Market Hypothesis** Prospectors, Inc., is a publicly traded gold prospecting company in Alaska. Although the firm's searches for gold usually fail, the prospectors occasionally find a rich vein of ore. What pattern would you expect to observe for Prospectors' cumulative abnormal returns if the market is efficient?
- 28. Evidence on Market Efficiency** Some people argue that the efficient market hypothesis cannot explain the 1987 market crash or the high price-to-earnings ratio of Internet stocks during the late 1990s. What alternative hypothesis is currently used for these two phenomena?

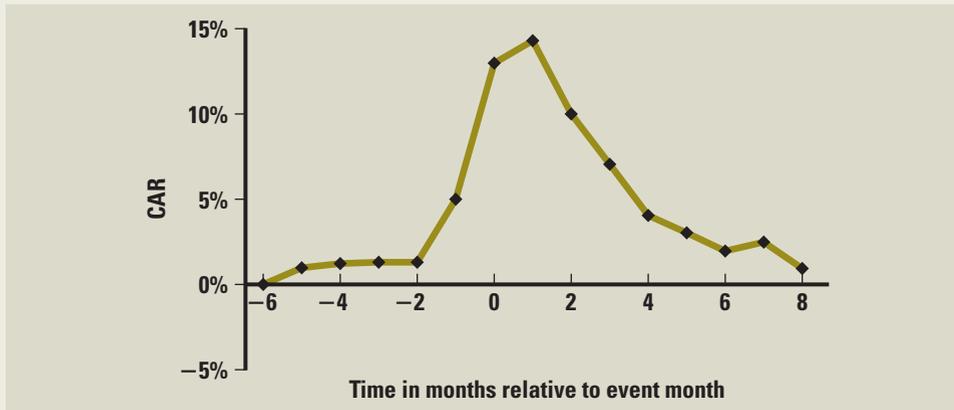
QUESTIONS AND PROBLEMS



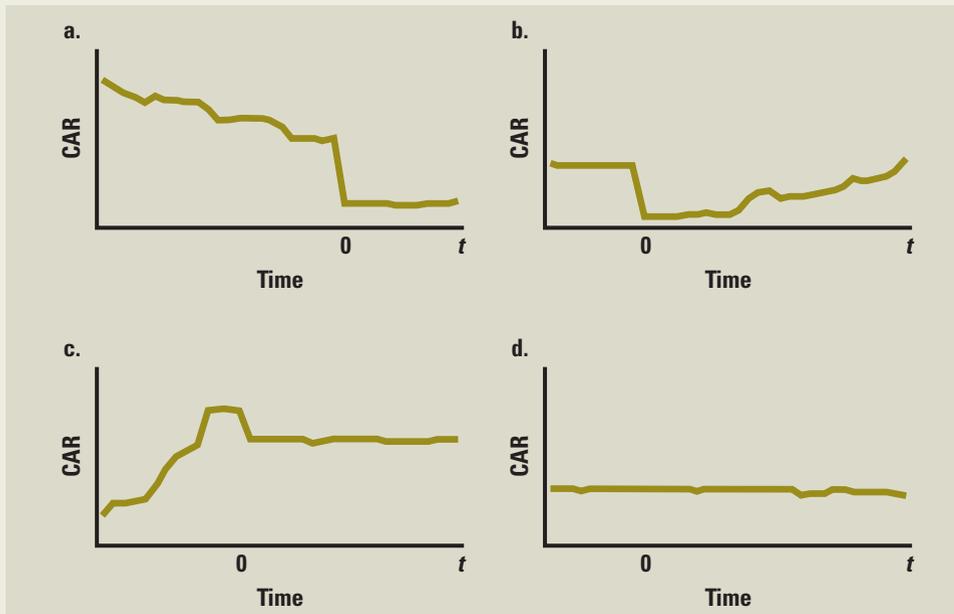
- 1. Cumulative Abnormal Returns** Delta, United, and American Airlines announced purchases of planes on July 18 (7/18), February 12 (2/12), and October 7 (10/7), respectively. Given the information below, calculate the cumulative abnormal return (CAR) for these stocks as a group. Graph the result and provide an explanation. All of the stocks have a beta of 1.0 and no other announcements are made.

DELTA			UNITED			AMERICAN		
DATE	MARKET RETURN	COMPANY RETURN	DATE	MARKET RETURN	COMPANY RETURN	DATE	MARKET RETURN	COMPANY RETURN
7/12	-.3	-.5	2/8	-.9	-1.1	10/1	.5	.3
7/13	.0	.2	2/9	-1.0	-1.1	10/2	.4	.6
7/16	.5	.7	2/10	.4	.2	10/3	1.1	1.1
7/17	-.5	-.3	2/11	.6	.8	10/6	.1	-.3
7/18	-2.2	1.1	2/12	-.3	-.1	10/7	-2.2	-.3
7/19	-.9	-.7	2/15	1.1	1.2	10/8	.5	.5
7/20	-1.0	-1.1	2/16	.5	.5	10/9	-.3	-.2
7/23	.7	.5	2/17	-.3	-.2	10/10	.3	.1
7/24	.2	.1	2/18	.3	.2	10/13	.0	-.1

2. Cumulative Abnormal Returns The following diagram shows the cumulative abnormal returns (CAR) for 386 oil exploration companies announcing oil discoveries over the period from 1950 to 1980. Month 0 in the diagram is the announcement month. Assume that no other information is received and the stock market as a whole does not move. Is the diagram consistent with market efficiency? Why or why not?

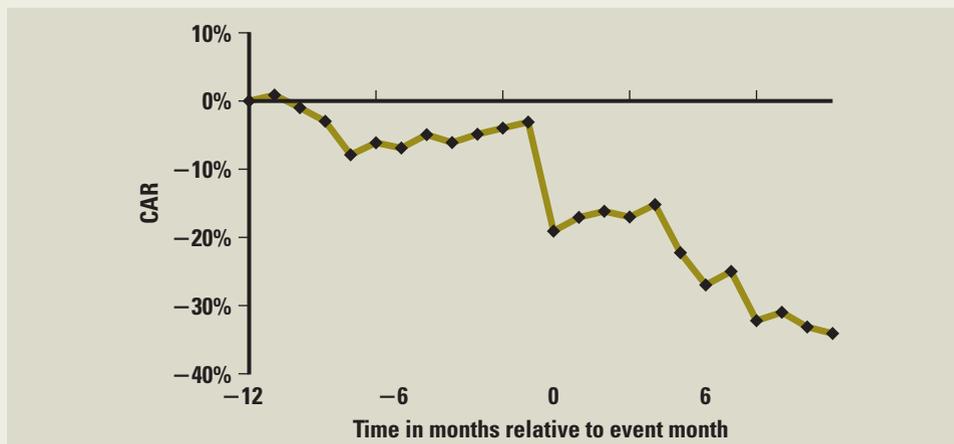


3. Cumulative Abnormal Returns The following figures present the results of four cumulative abnormal returns (CAR) studies. Indicate whether the results of each study support, reject, or are inconclusive about the semistrong form of the efficient market hypothesis. In each figure, time 0 is the date of an event.



4. Cumulative Abnormal Returns A study analyzed the behavior of the stock prices of firms that had lost antitrust cases. Included in the diagram are all firms that lost the initial court decision, even if the decision was later overturned on appeal. The event at time 0 is the initial, preappeal court decision. Assume no other information was released, aside from that disclosed in

the initial trial. The stock prices all have a beta of one. Is the diagram consistent with market efficiency? Why or why not?



WHAT'S ON THE WEB?

- Cumulative Abnormal Returns** On February 28, 2005, Elan (ELN) and Biogen Idec (BIIB) suspended sales and clinical trials of their multiple sclerosis drug Tysabri because of a patient fatality. The decision to pull the drug was based on the fatality and one other suspected case of a rare and often fatal disease of the central nervous system. According to the companies, both patients had received more than two years of Tysabri therapy plus the Biogen drug Avonex. Go to finance.yahoo.com and find the historical stock prices for each company 15 days before and 15 days after February 28, 2005. Construct the cumulative abnormal return for each company compared to the S&P 500 Index. Did each company's stock fall by the same percentage? How can you explain this? What does the trading volume look like for each stock over this same period?

YOUR 401(K) ACCOUNT AT EAST COAST YACHTS

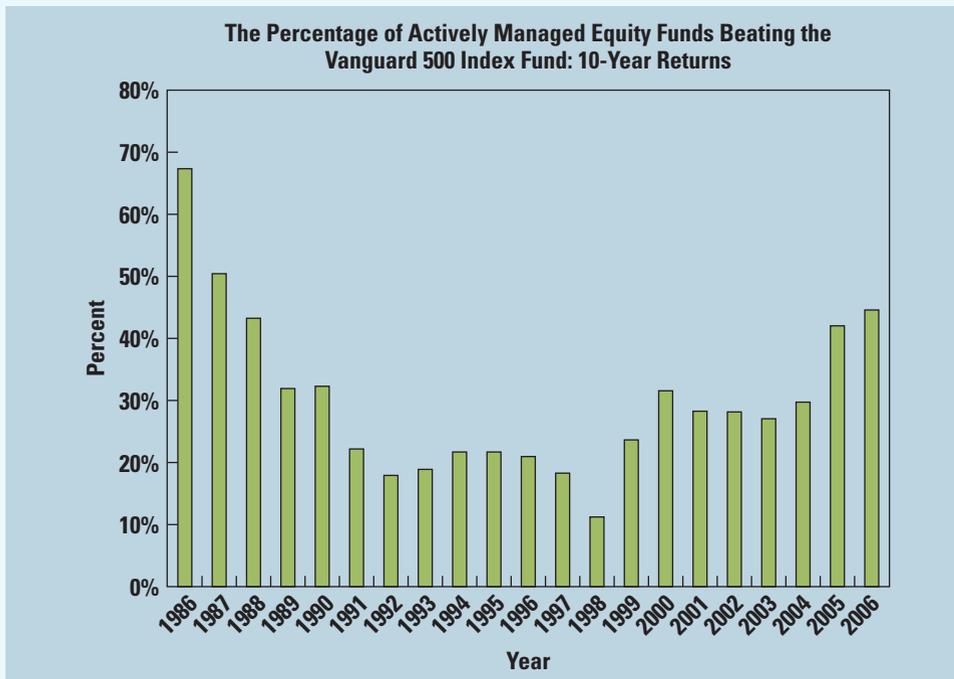
CLOSING CASE You have been at your job with East Coast Yachts for a week now and have decided you need to sign up for the company's 401(k) plan. Even after your discussion with Sarah Brown, the Bledsoe Financial Services representative, you are still unsure as to which investment option you should choose. Recall that the options available to you are stock in East Coast Yachts, the Bledsoe S&P 500 Index Fund, the Bledsoe Small-Cap Fund, the Bledsoe Large-Company Stock Fund, the Bledsoe Bond Fund, and the Bledsoe Money Market Fund. You have decided that you should invest in a diversified portfolio, with 70 percent of your investment in equity, 25 percent in bonds, and 5 percent in the money market fund. You have also decided to focus your equity investment on large-cap stocks, but you are debating whether to select the S&P 500 Index Fund or the Large-Company Stock Fund.

In thinking it over, you understand the basic difference in the two funds. One is a purely passive fund that replicates a widely followed large-cap index, the S&P 500, and has low fees. The other is

actively managed with the intention that the skill of the portfolio manager will result in improved performance relative to an index. Fees are higher in the latter fund. You're just not certain on which way to go, so you ask Dan Ervin, who works in the company's finance area, for advice.

After discussing your concerns, Dan gives you some information comparing the performance of equity mutual funds and the Vanguard 500 Index Fund. The Vanguard 500 is the world's largest equity index mutual fund. It replicates the S&P 500, and its return is only negligibly different from the S&P 500. Fees are very low. As a result, the Vanguard 500 is essentially identical to the Bledsoe S&P 500 Index Fund offered in the 401(k) plan, but it has been in existence for much longer, so you can study its track record for over two decades. The graph below summarizes Dan's comments by showing the percentage of equity mutual funds that outperformed the Vanguard 500 Fund over the previous ten years.¹ So for example, from January 1977 to December 1986, almost 70 percent of equity mutual funds outperformed the Vanguard 500. Dan suggests that you study the graph and answer the following questions:

1. What implications do you draw from the graph for mutual fund investors?
2. Is the graph consistent or inconsistent with market efficiency? Explain carefully.
3. What investment decision would you make for the equity portion of your 401(k) account? Why?



Source: Author calculations using data from the Center for Research in Security Prices (CRSP) Survivor Bias-Free U.S. Mutual Fund Database.

¹Note that this graph is not hypothetical; it reflects the actual performance of the Vanguard 500 Index Fund relative to a very large population of diversified equity mutual funds. Specialty funds, such as international funds, are excluded. All returns are net of management fees, but do not include sales charges (which are known as "loads"), if any. As a result, the performance of actively managed funds is overstated.