CHAPTER TWELVE

MARKET EFFICIENCY

One of the early applications of computers in economics in the 1950s was to analyze economic time series. Business cycle theorists felt that tracing the evolution of several economic variables over time would clarify and predict the progress of the economy through boom and bust periods. A natural candidate for analysis was the behavior of stock market prices over time. Assuming that stock prices reflect the prospects of the firm, recurrent patterns of peaks and troughs in economic performance ought to show up in those prices. Maurice Kendall examined this proposition in 1953.1 He found to his great surprise that he could identify no predictable patterns in stock prices. Prices seemed to evolve randomly. They were as likely to go up as they were to go down on any particular day, regardless of past performance. The data provided no way to predict price movements. At first blush, Kendall’s results were disturbing to some financial economists. They seemed to imply that the stock market is dominated by erratic market psychology, or “animal spirits”—that it follows no logical rules. In short, the results appeared to confirm the irrationality of the market. On further reflection, however, economists came to reverse their interpretation of Kendall’s study. It soon became apparent that random price movements indicated a well-functioning or efficient market, not an irrational one. In this chapter we explore the reasoning behind what may seem a surprising conclusion. We show how competition among analysts leads naturally to market efficiency, and we examine the implications of the efficient market hypothesis for investment policy. We also consider empirical evidence that supports and contradicts the notion of market efficiency.

12.1 RANDOM WALKS AND THE EFFICIENT MARKET HYPOTHESIS

Suppose Kendall had discovered that stock prices are predictable. What a gold mine this would have been for investors! If they could use Kendall’s equations to predict stock prices, investors would reap unending profits simply by purchasing stocks that the computer model implied were about to increase in price and by selling those stocks about to fall in price.

A moment’s reflection should be enough to convince yourself that this situation could not persist for long. For example, suppose that the model predicts with great confidence that XYZ stock price, currently at $100 per share, will rise dramatically in three days to $110. What would all investors with access to the model’s prediction do today? Obviously, they would place a great wave of immediate buy orders to cash in on the prospective increase in stock price. No one holding XYZ, however, would be willing to sell. The net effect would be an immediate jump in the stock price to $110. The forecast of a future price increase will lead instead to an immediate price increase. In other words, the stock price will immediately reflect the “good news” implicit in the model’s forecast.

This simple example illustrates why Kendall’s attempt to find recurrent patterns in stock price movements was doomed to failure. A forecast about favorable future performance leads instead to favorable current performance, as market participants all try to get in on the action before the price jump.

More generally, one might say that any information that could be used to predict stock performance should already be reflected in stock prices. As soon as there is any information indicating that a stock is underpriced and therefore offers a profit opportunity, investors flock to buy the stock and immediately bid up its price to a fair level, where only ordinary rates of return can be expected. These “ordinary rates” are simply rates of return commensurate with the risk of the stock.

However, if prices are bid immediately to fair levels, given all available information, it must be that they increase or decrease only in response to new information. New information, by definition, must be unpredictable; if it could be predicted, then the prediction would be part of today’s information. Thus stock prices that change in response to new (unpredictable) information also must move unpredictably.

This is the essence of the argument that stock prices should follow a random walk, that is, that price changes should be random and unpredictable. Far from a proof of market irrationality, randomly evolving stock prices are the necessary consequence of intelligent investors competing to discover relevant information on which to buy or sell stocks before the rest of the market becomes aware of that information.

Don’t confuse randomness in price changes with irrationality in the level of prices. If prices are determined rationally, then only new information will cause them to change. Therefore, a random walk would be the natural result of prices that always reflect all current knowledge. Indeed, if stock price movements were predictable, that would be damning evidence of stock market inefficiency, because the ability to predict prices would indicate that all available information was not already reflected in stock prices. Therefore, the notion that stocks already reflect all available information is referred to as the efficient market hypothesis (EMH).

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2 Actually, we are being a little loose with terminology here. Strictly speaking, we should characterize stock prices as following a submartingale, meaning that the expected change in the price can be positive, presumably as compensation for the time value of money and systematic risk. Moreover, the expected return may change over time as risk factors change. A random walk is more restrictive in that it constrains successive stock returns to be independent and identically distributed. Nevertheless, the term “random walk” is commonly used in the looser sense that price changes are essentially unpredictable. We will follow this convention.

3 Market efficiency should not be confused with the idea of efficient portfolios introduced in Chapter 8. An informationally efficient market is one in which information is rapidly disseminated and reflected in prices. An efficient portfolio is one with the highest expected return for a given level of risk.
Competition as the Source of Efficiency

Why should we expect stock prices to reflect “all available information”? After all, if you are willing to spend time and money on gathering information, it might seem reasonable that you could turn up something that has been overlooked by the rest of the investment community. When information is costly to uncover and analyze, one would expect investment analysis calling for such expenditures to result in an increased expected return. This point has been stressed by Grossman and Stiglitz. They argued that investors will have an incentive to spend time and resources to analyze and uncover new information only if such activity is likely to generate higher investment returns. Thus, in market equilibrium, efficient information-gathering activity should be fruitful. Moreover, it would not be surprising to find that the degree of efficiency differs across various markets. For example, emerging markets that are less intensively analyzed than U.S. markets and in which accounting disclosure requirements are much less rigorous may be less efficient than U.S. markets. Small stocks which receive relatively little coverage by Wall Street analysts may be less efficiently priced than large ones. Therefore, while we would not go so far as to say that you absolutely cannot come up with new information, it still makes sense to consider and respect your competition.

Consider an investment management fund currently managing a $5 billion portfolio. Suppose that the fund manager can devise a research program that could increase the portfolio rate of return by one-tenth of 1% per year, a seemingly modest amount. This program would increase the dollar return to the portfolio by $5 billion × .001, or $5 million. Therefore, the fund would be willing to spend up to $5 million per year on research to increase stock returns by a mere tenth of 1% per year. With such large rewards for such small increases in investment performance, it should not be surprising that professional portfolio managers are willing to spend large sums on industry analysts, computer support, and research effort, and therefore that price changes are, generally speaking, difficult to predict. With so many well-backed analysts willing to spend considerable resources on research, easy pickings in the market are rare. Moreover, the incremental rates of return on research activity are likely to be so small that only managers of the largest portfolios will find them worth pursuing.

Although it may not literally be true that “all” relevant information will be uncovered, it is virtually certain that there are many investigators hot on the trail of most leads that seem likely to improve investment performance. Competition among these many well-backed, highly paid, aggressive analysts ensures that, as a general rule, stock prices ought to reflect available information regarding their proper levels.

Versions of the Efficient Market Hypothesis

It is common to distinguish among three versions of the EMH: the weak, semistrong, and strong forms of the hypothesis. These versions differ by their notions of what is meant by the term “all available information.”

The weak-form hypothesis asserts that stock prices already reflect all information that can be derived by examining market trading data such as the history of past prices, trading volume, or short interest. This version of the hypothesis implies that trend analysis is fruitless. Past stock price data are publicly available and virtually costless to obtain. The weak-form hypothesis holds that if such data ever conveyed reliable signals about future

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performance, all investors already would have learned to exploit the signals. Ultimately, the signals lose their value as they become widely known because a buy signal, for instance, would result in an immediate price increase.

The semistrong-form hypothesis states that all publicly available information regarding the prospects of a firm must be reflected already in the stock price. Such information includes, in addition to past prices, fundamental data on the firm’s product line, quality of management, balance sheet composition, patents held, earning forecasts, and accounting practices. Again, if investors have access to such information from publicly available sources, one would expect it to be reflected in stock prices.

Finally, the strong-form version of the efficient market hypothesis states that stock prices reflect all information relevant to the firm, even including information available only to company insiders. This version of the hypothesis is quite extreme. Few would argue with the proposition that corporate officers have access to pertinent information long enough before public release to enable them to profit from trading on that information. Indeed, much of the activity of the Securities and Exchange Commission is directed toward preventing insiders from profiting by exploiting their privileged situation. Rule 10b-5 of the Security Exchange Act of 1934 sets limits on trading by corporate officers, directors, and substantial owners, requiring them to report trades to the SEC. These insiders, their relatives, and any associates who trade on information supplied by insiders are considered in violation of the law.

Defining insider trading is not always easy, however. After all, stock analysts are in the business of uncovering information not already widely known to market participants. As we saw in Chapter 3, the distinction between private and inside information is sometimes murky.

12.2 IMPLICATIONS OF THE EMH FOR INVESTMENT POLICY

Technical Analysis

Technical analysis is essentially the search for recurrent and predictable patterns in stock prices. Although technicians recognize the value of information regarding future economic prospects of the firm, they believe that such information is not necessary for a successful trading strategy. This is because whatever the fundamental reason for a change in stock price, if the stock price responds slowly enough, the analyst will be able to identify a trend that can be exploited during the adjustment period. The key to successful technical analysis is a sluggish response of stock prices to fundamental supply-and-demand factors. This prerequisite, of course, is diametrically opposed to the notion of an efficient market.

Technical analysts are sometimes called chartists because they study records or charts of past stock prices, hoping to find patterns they can exploit to make a profit. Figure 12.1 shows some of the types of patterns a chartist might hope to identify. The chartist may draw lines connecting the high and low prices for the day to examine any trends in the prices (Figure 12.1, A). The crossbars indicate closing prices. This is called a search for “momentum.” More complex patterns, such as the “breakaway” (Figure 12.1, B) or “head and
shoulders” (Figure 12.1, C), are also believed to convey clear buy or sell signals. The head and shoulders is named for its rough resemblance to a portrait of a head with surrounding shoulders. Once the right shoulder is penetrated (known as piercing the neckline) chartists believe the stock is on the verge of a major decline in price.

The Dow theory, named after its creator Charles Dow (who established The Wall Street Journal), is the grandfather of most technical analysis. The aim of the Dow theory is to identify long-term trends in stock market prices. The two indicators used are the Dow Jones Industrial Average (DJIA) and the Dow Jones Transportation Average (DJTA). The DJIA is the key indicator of underlying trends, while the DJTA usually serves as a check to confirm or reject that signal.
The Dow theory posits three forces simultaneously affecting stock prices:

1. The primary trend is the long-term movement of prices, lasting from several months to several years.
2. Secondary or intermediate trends are caused by short-term deviations of prices from the underlying trend line. These deviations are eliminated via corrections, when prices revert back to trend values.
3. Tertiary or minor trends are daily fluctuations of little importance.

Figure 12.2 represents these three components of stock price movements. In this figure, the primary trend is upward, but intermediate trends result in short-lived market declines lasting a few weeks. The intraday minor trends have no long-run impact on price.

Figure 12.3 depicts the course of the DJIA during 1988, a year that seems to provide a good example of price patterns consistent with Dow theory. The primary trend is upward,
as evidenced by the fact that each market peak is higher than the previous peak (point $F$ versus $D$ versus $B$). Similarly, each low is higher than the previous low ($E$ versus $C$ versus $A$). This pattern of upward-moving “tops” and “bottoms” is one of the key ways to identify the underlying primary trend. Notice in Figure 12.3 that, despite the upward primary trend, intermediate trends still can lead to short periods of declining prices (points $B$ through $C$, or $D$ through $E$).

In evaluating the Dow theory, don’t forget the lessons of the efficient market hypothesis. The Dow theory is based on a notion of predictably recurring price patterns. Yet the EMH holds that if any pattern is exploitable, many investors would attempt to profit from such predictability, which would ultimately move stock prices and cause the trading strategy to self-destruct. Although Figure 12.3 certainly appears to describe a classic upward primary trend, one always must wonder whether we can see that trend only after the fact. Recognizing patterns as they emerge is far more difficult.

More recent variations on the Dow theory are the Elliott wave theory and the theory of Kondratieff waves. Like the Dow theory, the idea behind Elliott waves is that stock prices can be described by a set of wave patterns. Long-term and short-term wave cycles are superimposed and result in a complicated pattern of price movements, but by interpreting the cycles, one can, according to the theory, predict broad movements. Similarly, Kondratieff waves are named after a Russian economist who asserted that the macroeconomy (and thus the stock market) moves in broad waves lasting between 48 and 60 years. The Kondratieff waves are therefore analogous to Dow’s primary trend, although of far longer duration. Kondratieff’s assertion is hard to evaluate empirically, however, because cycles that last about 50 years can provide only two independent data points per century, which is hardly enough data to test the predictive power of the theory.

Other chartist techniques involve moving averages. In one version of this approach average prices over the past several months are taken as indicators of the “true value” of the stock. If the stock price is above this value, it may be expected to fall. In another version, the moving average is taken as indicative of long-run trends. If the trend has been downward and if the current stock price is below the moving average, then a subsequent increase in the stock price above the moving average line (a “breakthrough”) might signal a reversal of the downward trend.

Another technique is called the relative strength approach. The chartist compares stock performance over a recent period to performance of the market or other stocks in the same industry. A simple version of relative strength takes the ratio of the stock price to a market indicator such as the S&P 500 index. If the ratio increases over time, the stock is said to exhibit relative strength because its price performance is better than that of the broad market. Such strength presumably may continue for a long enough period of time to offer profit opportunities.

One of the most commonly heard components of technical analysis is the notion of resistance levels or support levels. These values are said to be price levels above which it is difficult for stock prices to rise, or below which it is unlikely for them to fall, and they are believed to be levels determined by market psychology.

Consider, for example, stock XYZ, which traded for several months at a price of $72, and then declined to $65. If the stock eventually begins to increase in price, $72 is considered a resistance level (according to this theory) because investors who bought originally at $72 will be eager to sell their shares as soon as they can break even on their investment. Therefore, at prices near $72 a wave of selling pressure would exist. Such activity imparts a type of “memory” to the market that allows past price history to influence current stock prospects.

Technical analysts also focus on the volume of trading. The idea is that a price decline accompanied by heavy trading volume signals a more bearish market than if volume were
smaller, because the price decline is taken as representing broader-based selling pressure. For example, the trin statistic ("trin" stands for trading index) equals

$$\text{Trin} = \frac{\text{Volume declining}}{\text{Number declining}} \div \frac{\text{Volume advancing}}{\text{Number advancing}}$$

Therefore, trin is the ratio of average volume in declining issues to average volume in advancing issues. Ratios above 1.0 are considered bearish because the falling stocks would then have higher average volume than the advancing stocks, indicating net selling pressure. The Wall Street Journal reports trin every day in the market diary section, as in Figure 12.4.

Note, however, for every buyer there must be a seller of stock. High volume in a falling market should not necessarily indicate a larger imbalance of buyers versus sellers. For example, a trin statistic above 1.0, which is considered bearish, could equally well be interpreted as indicating that there is more buying activity in declining issues.

The efficient market hypothesis implies that technical analysis is without merit. The past history of prices and trading volume is publicly available at minimal cost. Therefore, any information that was ever available from analyzing past prices has already been reflected in stock prices. As investors compete to exploit their common knowledge of a stock’s price history, they necessarily drive stock prices to levels where expected rates of return are exactly commensurate with risk. At those levels one cannot expect abnormal returns.

As an example of how this process works, consider what would happen if the market believed that a level of $72 truly were a resistance level for stock XYZ. No one would be willing to purchase the stock at a price of $71.50, because it would have almost no room to increase in price, but ample room to fall. However, if no one would buy it at $71.50, then $71.50 would become a resistance level. But then, using a similar analysis, no one would buy it at $71, or $70, and so on. The notion of a resistance level is a logical conundrum. Its simple resolution is the recognition that if the stock is ever to sell at $71.50, investors must
believe that the price can as easily increase as fall. The fact that investors are willing to pur-
chase (or even hold) the stock at $71.50 is evidence of their belief that they can earn a fair 
expected rate of return at that price.

An interesting question is whether a technical rule that seems to work will continue to 
work in the future once it becomes widely recognized. A clever analyst may occasionally 
uncover a profitable trading rule, but the real test of efficient markets is whether the rule it-
self becomes reflected in stock prices once its value is discovered.

Suppose, for example, that the Dow theory predicts an upward primary trend. If the the-
ory is widely accepted, it follows that many investors will attempt to buy stocks immedi-
ately in anticipation of the price increase; the effect would be to bid up prices sharply and 
immediately rather than at the gradual, long-lived pace initially expected. The Dow the-
ory’s predicted trend would be replaced by a sharp jump in prices. It is in this sense that 
price patterns ought to be self-destructing. Once a useful technical rule (or price pattern) is 
discovered, it ought to be invalidated when the mass of traders attempt to exploit it.

Thus the market dynamic is one of a continual search for profitable trading rules, fol-
lowed by destruction by overuse of those rules found to be successful, followed by more 
search for yet-undiscovered rules.

Fundamental Analysis

Fundamental analysis uses earnings and dividend prospects of the firm, expectations of 
future interest rates, and risk evaluation of the firm to determine proper stock prices. Ulti-
mately, it represents an attempt to determine the present discounted value of all the pay-
ments a stockholder will receive from each share of stock. If that value exceeds the stock 
price, the fundamental analyst would recommend purchasing the stock.

Fundamental analysts usually start with a study of past earnings and an examination of 
company balance sheets. They supplement this analysis with further detailed economic 
analysis, ordinarily including an evaluation of the quality of the firm’s management, the 
firm’s standing within its industry, and the prospects for the industry as a whole. The hope 
is to attain insight into future performance of the firm that is not yet recognized by the rest 
of the market. Chapters 17 through 19 provide a detailed discussion of the types of analy-
ses that underlie fundamental analysis.

Once again, the efficient market hypothesis predicts that most fundamental analysis also 
is doomed to failure. If the analyst relies on publicly available earnings and industry infor-
mation, his or her evaluation of the firm’s prospects is not likely to be significantly more 
accurate than those of rival analysts. There are many well-informed, well-financed firms 
conducting such market research, and in the face of such competition it will be difficult to 
uncover data not also available to other analysts. Only analysts with a unique insight will 
be rewarded.

Fundamental analysis is much more difficult than merely identifying well-run firms 
with good prospects. Discovery of good firms does an investor no good in and of itself if 
the rest of the market also knows those firms are good. If the knowledge is already public, 
the investor will be forced to pay a high price for those firms and will not realize a superior 
rate of return.
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The trick is not to identify firms that are good, but to find firms that are better than everyone else’s estimate. Similarly, poorly run firms can be great bargains if they are not quite as bad as their stock prices suggest.

This is why fundamental analysis is difficult. It is not enough to do a good analysis of a firm; you can make money only if your analysis is better than that of your competitors because the market price will already reflect all commonly available information.

Active versus Passive Portfolio Management

By now it is apparent that casual efforts to pick stocks are not likely to pay off. Competition among investors ensures that any easily implemented stock evaluation technique will be used widely enough so that any insights derived will be reflected in stock prices. Only serious analysis and uncommon techniques are likely to generate the differential insight necessary to yield trading profits.

Moreover, these techniques are economically feasible only for managers of large portfolios. If you have only $100,000 to invest, even a 1% per year improvement in performance generates only $1,000 per year, hardly enough to justify herculean efforts. The billion-dollar manager, however, reaps extra income of $10 million annually from the same 1% increment.

If small investors are not in a favored position to conduct active portfolio management, what are their choices? The small investor probably is better off investing in mutual funds. By pooling resources in this way, small investors can gain from economies of scale.

More difficult decisions remain, though. Can investors be sure that even large mutual funds have the ability or resources to uncover mispriced stocks? Furthermore, will any mis-pricing be sufficiently large to repay the costs entailed in active portfolio management?

Proponents of the efficient market hypothesis believe that active management is largely wasted effort and unlikely to justify the expenses incurred. Therefore, they advocate a passive investment strategy that makes no attempt to outsmart the market. A passive strategy aims only at establishing a well-diversified portfolio of securities without attempting to find under- or overvalued stocks. Passive management is usually characterized by a buy-and-hold strategy. Because the efficient market theory indicates that stock prices are at fair levels, given all available information, it makes no sense to buy and sell securities frequently, which generates large brokerage fees without increasing expected performance.

One common strategy for passive management is to create an index fund, which is a fund designed to replicate the performance of a broad-based index of stocks. For example, in 1976 the Vanguard Group of mutual funds introduced a mutual fund called the Index 500 Portfolio, which holds stocks in direct proportion to their weight in the Standard & Poor’s 500 stock price index. The performance of the Index 500 fund therefore replicates the performance of the S&P 500. Investors in this fund obtain broad diversification with relatively low management fees. The fees can be kept to a minimum because Vanguard does not need to pay analysts to assess stock prospects and does not incur transaction costs from high portfolio turnover. Indeed, while the typical annual charge for an actively managed equity fund is more than 1% of assets, Vanguard charges a bit less than .2% for the Index 500 Portfolio.

Indexing has grown in appeal considerably since 1976. Vanguard’s Index 500 Portfolio was the largest mutual fund in 2000 with more than $100 billion in assets. Several other firms have introduced S&P 500 index funds, but Vanguard still dominates the retail market for indexing. Moreover, corporate pension plans now place more than one-fourth of their equity investments in index funds. Including pension funds and mutual funds, more than
$700 billion was indexed to the S&P 500 by mid-1999. Many institutional investors now hold indexed bond as well as indexed stock portfolios.

Mutual funds offer portfolios that match a wide variety of market indexes. For example, some of the funds offered by the Vanguard Group track the Wilshire 5000 index, the Salomon Brothers Broad Investment Grade Bond Index, the Russell 2000 index of small-capitalization companies, the European equity market, and the Pacific Basin equity market. A hybrid strategy also is fairly common, where the fund maintains a passive core, which is an indexed position, and augments that position with one or more actively managed portfolios.

The Role of Portfolio Management in an Efficient Market

If the market is efficient, why not throw darts at The Wall Street Journal instead of trying rationally to choose a stock portfolio? This is a tempting conclusion to draw from the notion that security prices are fairly set, but it is far too facile. There is a role for rational portfolio management, even in perfectly efficient markets.

You have learned that a basic principle in portfolio selection is diversification. Even if all stocks are priced fairly, each still poses firm-specific risk that can be eliminated through diversification. Therefore, rational security selection, even in an efficient market, calls for the selection of a well-diversified portfolio providing the systematic risk level that the investor wants.

Rational investment policy also requires that tax considerations be reflected in security choice. High-tax-bracket investors generally will not want the same securities that low-bracket investors find favorable. At an obvious level high-bracket investors find it advantageous to buy tax-exempt municipal bonds despite their relatively low pretax yields, whereas those same bonds are unattractive to low-tax-bracket investors. At a more subtle level high-bracket investors might want to tilt their portfolios in the direction of capital gains as opposed to dividend or interest income, because the option to defer the realization of capital gain income is more valuable the higher the current tax bracket. Hence these investors may prefer stocks that yield low dividends yet offer greater expected capital gain income. They also will be more attracted to investment opportunities for which returns are sensitive to tax benefits, such as real estate ventures.

A third argument for rational portfolio management relates to the particular risk profile of the investor. For example, a General Motors executive whose annual bonus depends on GM’s profits generally should not invest additional amounts in auto stocks. To the extent that his or her compensation already depends on GM’s well-being, the executive is already overinvested in GM and should not exacerbate the lack of diversification.

Investors of varying ages also might warrant different portfolio policies with regard to risk bearing. For example, older investors who are essentially living off savings might choose to avoid long-term bonds whose market values fluctuate dramatically with changes in interest rates (discussed in Part IV). Because these investors are living off accumulated savings, they require conservation of principal. In contrast, younger investors might be more inclined toward long-term bonds. The steady flow of income over long periods of time that is locked in with long-term bonds can be more important than preservation of principal to those with long life expectancies.
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In conclusion, there is a role for portfolio management even in an efficient market. Investors’ optimal positions will vary according to factors such as age, tax bracket, risk aversion, and employment. The role of the portfolio manager in an efficient market is to tailor the portfolio to these needs, rather than to beat the market.

12.3 EVENT STUDIES

The notion of informationally efficient markets leads to a powerful research methodology. If security prices reflect all currently available information, then price changes must reflect new information. Therefore, it seems that one should be able to measure the importance of an event of interest by examining price changes during the period in which the event occurs.

An event study describes a technique of empirical financial research that enables an observer to assess the impact of a particular event on a firm’s stock price. A stock market analyst might want to study the impact of dividend changes on stock prices, for example. An event study would quantify the relationship between dividend changes and stock returns. Using the results of such a study together with a superior means of predicting dividend changes, the analyst could in principle earn superior trading profits.

Analyzing the impact of an announced change in dividends is more difficult than it might at first appear. On any particular day stock prices respond to a wide range of economic news such as updated forecasts for GDP, inflation rates, interest rates, or corporate profitability. Isolating the part of a stock price movement that is attributable to a dividend announcement is not a trivial exercise.

The statistical approach that researchers commonly use to measure the impact of a particular information release, such as the announcement of a dividend change, is a marriage of efficient market theory with the index model discussed in Chapter 10. We want to measure the unexpected return that results from an event. This is the difference between the actual stock return and the return that might have been expected given the performance of the market. This expected return can be calculated using the index model.

Recall that the index model holds that stock returns are determined by a market factor and a firm-specific factor. The stock return, \( r_t \), during a given period \( t \), would be expressed mathematically as

\[
  r_t = a + b r_{Mt} + e_t
\]

where \( r_{Mt} \) is the market’s rate of return during the period and \( e_t \) is the part of a security’s return resulting from firm-specific events. The parameter \( b \) measures sensitivity to the market return, and \( a \) is the average rate of return the stock would realize in a period with a zero market return.\(^5\) Equation 12.1 therefore provides a decomposition of \( r_t \) into market and firm-specific factors. The firm-specific return may be interpreted as the unexpected return that results from the event.

Determination of the firm-specific return in a given period requires that we obtain an estimate of the term \( e_t \). Therefore, we rewrite equation 12.1:

\[
  e_t = r_t - (a + b r_{Mt})
\]

\(^5\) We know from Chapter 10, Section 10.3, that the CAPM implies that the intercept \( a \) in equation 12.1 should equal \( r_f (1 - \beta) \). Nevertheless, it is customary to estimate the intercept in this equation empirically rather than imposing the CAPM value. One justification for this practice is that empirically fitted security market lines seem flatter than predicted by the CAPM (see the next chapter), which would make the intercept implied by the CAPM too small.
Equation 12.2 has a simple interpretation: To determine the firm-specific component of a stock’s return, subtract the return that the stock ordinarily would earn for a given level of market performance from the actual rate of return on the stock. The residual, $e_t$, is the stock’s return over and above what one would predict based on broad market movements in that period, given the stock’s sensitivity to the market.

For example, suppose that the analyst has estimated that $a = .5\%$ and $b = .8$. On a day that the market goes up by 1%, you would predict from equation 12.1 that the stock should rise by an expected value of $0.5\% + 0.8 \times 1\% = 1.3\%$. If the stock actually rises by 2%, the analyst would infer that firm-specific news that day caused an additional stock return of $2\% - 1.3\% = .7\%$. We sometimes refer to the term $e_t$ in equation 12.2 as the abnormal return—the return beyond what would be predicted from market movements alone.

The general strategy in event studies is to estimate the abnormal return around the date that new information about a stock is released to the market and attribute the abnormal stock performance to the new information. The first step in the study is to estimate parameters $a$ and $b$ for each security in the study. These typically are calculated using index model regressions as described in Chapter 10 in a period before that in which the event occurs. The prior period is used for estimation so that the impact of the event will not affect the estimates of the parameters. Next, the information release dates for each firm are recorded. For example, in a study of the impact of merger attempts on the stock prices of target firms, the announcement date is the date on which the public is informed that a merger is to be attempted. Finally, the abnormal returns of each firm surrounding the announcement date are computed, and the statistical significance and magnitude of the typical abnormal return is assessed to determine the impact of the newly released information.

One concern that complicates event studies arises from leakage of information. Leakage occurs when information regarding a relevant event is released to a small group of investors before official public release. In this case the stock price might start to increase (in the case of a “good news” announcement) days or weeks before the official announcement date. Any abnormal return on the announcement date is then a poor indicator of the total impact of the information release. A better indicator would be the cumulative abnormal return, which is simply the sum of all abnormal returns over the time period of interest. The cumulative abnormal return thus captures the total firm-specific stock movement for an entire period when the market might be responding to new information.

Figure 12.5 presents the results from a fairly typical event study. The authors of this study were interested in leakage of information before merger announcements and constructed a sample of 194 firms that were targets of takeover attempts. In most takeovers, stockholders of the acquired firms sell their shares to the acquirer at substantial premiums over market value. Announcement of a takeover attempt is good news for shareholders of the target firm and therefore should cause stock prices to jump.

Figure 12.5 confirms the good-news nature of the announcements. On the announcement day, called day 0, the average cumulative abnormal return (CAR) for the sample of takeover candidates increases substantially, indicating a large and positive abnormal return on the announcement date. Notice that immediately after the announcement date the CAR no longer increases or decreases significantly. This is in accord with the efficient market hypothesis. Once the new information became public, the stock prices jumped almost immediately in response to the good news. With prices once again fairly set, reflecting the effect of the new information, further abnormal returns on any particular day are equally likely to be positive or negative. In fact, for a sample of many firms, the average abnormal return will be extremely close to zero, and thus the CAR will show neither upward nor downward drift. This is precisely the pattern shown in Figure 12.5.
The lack of drift in CAR after the public announcement date is perhaps the clearest evidence of an efficient market impounding information into stock prices. This pattern is commonly observed. For example, Figure 12.6 presents results from an event study on dividend announcements. As expected, the firms announcing dividend increases enjoy positive abnormal returns, whereas those with dividend decreases suffer negative abnormal returns. In both cases, however, once the information is made public, the stock price seems to adjust fully, with CARs exhibiting neither upward nor downward drift.

The pattern of returns for the days preceding the public announcement date yields some interesting evidence about efficient markets and information leakage. If insider trading rules were perfectly obeyed and perfectly enforced, stock prices should show no abnormal returns on days before the public release of relevant news, because no special firm-specific information would be available to the market before public announcement. Instead, we should observe a clean jump in the stock price only on the announcement day. In fact, Figure 12.5 shows that the prices of the takeover targets clearly start an upward drift 30 days before the public announcement. There are two possible interpretations of this pattern. One is that information is leaking to some market participants who then purchase the stocks before the public announcement. At least some abuse of insider trading rules is occurring.

Another interpretation is that in the days before a takeover attempt the public becomes suspicious of the attempt as it observes someone buying large blocks of stock. As acquisition intentions become more evident, the probability of an attempted merger is gradually revised upward so that we see a gradual increase in CARs. Although this interpretation is certainly a valid possibility, evidence of leakage appears almost universally in event studies, even in cases where the public’s access to information is not gradual. For example, the
CARs associated with the dividend announcement presented in Figure 12.6 also exhibit leakage. It appears as if insider trading violations do occur.

Actually, the SEC itself can take some comfort from patterns such as that in Figures 12.5 and 12.6. If insider trading rules were widely and flagrantly violated, we would expect to see abnormal returns earlier than they appear in these results. For example, in the case of mergers, the CAR would turn positive as soon as acquiring firms decided on their takeover targets, because insiders would start trading immediately. By the time of the public announcement, the insiders would have bid up the stock prices of target firms to levels reflecting the merger attempt, and the abnormal returns on the actual public announcement date would be close to zero. The dramatic increase in the CAR that we see on the announcement date indicates that a good deal of these announcements are indeed news to the market and that stock prices did not already reflect complete knowledge about the takeovers. It would appear, therefore, that SEC enforcement does have a substantial effect on restricting insider trading, even if some amount of it still persists.

Event study methodology has become a widely accepted tool to measure the economic impact of a wide range of events. For example, the SEC regularly uses event studies to measure illicit gains captured by traders who may have violated insider trading or other securities laws.6 Event studies are also used in fraud cases, where the courts must assess damages caused by a fraudulent activity. As an example of the technique, suppose that a company with a market value of $100 million suffers an abnormal return of −6% on the day that news of a fraudulent activity surfaces. One might then infer that the damages

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sustained from the fraud were $6 million, because the value of the firm (after adjusting for general market movements) fell by 6% of $100 million when investors became aware of the news and reassessed the value of the stock.

**CONCEPT CHECK QUESTION 4**

Suppose that we see negative abnormal returns (declining CARs) after an announcement date. Is this a violation of efficient markets?

### 12.4 ARE MARKETS EFFICIENT?

**The Issues**

Not surprisingly, the efficient market hypothesis does not exactly arouse enthusiasm in the community of professional portfolio managers. It implies that a great deal of the activity of portfolio managers—the search for undervalued securities—is at best wasted effort, and quite probably harmful to clients because it costs money and leads to imperfectly diversified portfolios. Consequently, the EMH has never been widely accepted on Wall Street, and debate continues today on the degree to which security analysis can improve investment performance. Before discussing empirical tests of the hypothesis, we want to note three factors that together imply that the debate probably never will be settled: the magnitude issue, the selection bias issue, and the lucky event issue.

**The Magnitude Issue**  
We have noted that an investment manager overseeing a $5 billion portfolio who can improve performance by only .001% per year will increase investment earnings by \( .001 \times \frac{5}{1000} \times 5 \text{ billion} = 5 \text{ million} \) annually. This manager clearly would be worth her salary! Yet can we, as observers, statistically measure her contribution? Probably not: A .001% contribution would be swamped by the yearly volatility of the market. Remember, the annual standard deviation of the well-diversified S&P 500 index has been more than 20% per year. Against these fluctuations a small increase in performance would be hard to detect. Nevertheless, $5 million remains an extremely valuable improvement in performance.

All might agree that stock prices are very close to fair values, and that only managers of large portfolios can earn enough trading profits to make the exploitation of minor mispricing worth the effort. According to this view, the actions of intelligent investment managers are the driving force behind the constant evolution of market prices to fair levels. Rather than ask the qualitative question “Are markets efficient?” we ought instead to ask a more quantitative question: “How efficient are markets?”

**The Selection Bias Issue**  
Suppose that you discover an investment scheme that could really make money. You have two choices: either publish your technique in *The Wall Street Journal* to win fleeting fame, or keep your technique secret and use it to earn millions of dollars. Most investors would choose the latter option, which presents us with a conundrum. Only investors who find that an investment scheme cannot generate abnormal returns will be willing to report their findings to the whole world. Hence opponents of the efficient markets view of the world always can use evidence that various techniques do not provide investment rewards as proof that the techniques that do work simply are not being reported to the public. This is a problem in *selection bias*; the outcomes we are able to observe have been preselected in favor of failed attempts. Therefore, we cannot fairly evaluate the true ability of portfolio managers to generate winning stock market strategies.
The Lucky Event Issue  In virtually any month it seems we read an article about some investor or investment company with a fantastic investment performance over the recent past. Surely the superior records of such investors disprove the efficient market hypothesis.

Yet this conclusion is far from obvious. As an analogy to the investment game, consider a contest to flip the most number of heads out of 50 trials using a fair coin. The expected outcome for any person is, of course, 50% heads and 50% tails. If 10,000 people, however, compete in this contest, it would not be surprising if at least one or two contestants flipped more than 75% heads. In fact, elementary statistics tells us that the expected number of contestants flipping 75% or more heads would be two. It would be silly, though, to crown these people the “head-flipping champions of the world.” Obviously, they are simply the contestants who happened to get lucky on the day of the event. (See the nearby box.)

The analogy to efficient markets is clear. Under the hypothesis that any stock is fairly priced given all available information, any bet on a stock is simply a coin toss. There is equal likelihood of winning or losing the bet. However, if many investors using a variety of schemes make fair bets, statistically speaking, some of those investors will be lucky and win a great majority of the bets. For every big winner, there may be many big losers, but we never hear of these managers. The winners, though, turn up in The Wall Street Journal as the latest stock market gurus; then they can make a fortune publishing market newsletters.

Our point is that after the fact there will have been at least one successful investment scheme. A doubter will call the results luck, the successful investor will call it skill. The proper test would be to see whether the successful investors can repeat their performance in another period, yet this approach is rarely taken.

HOW TO GUARANTEE A SUCCESSFUL MARKET NEWSLETTER

Suppose you want to make your fortune publishing a market newsletter. You need first to convince potential subscribers that you have talent worth paying for. But what if you have no talent? The solution is simple: start eight newsletters.

In year 1, let four of your newsletters predict an up-market and four a down-market. In year 2, let half of the originally optimistic group of newsletters continue to predict an up-market and the other half a down-market. Do the same for the originally pessimistic group. Continue in this manner to obtain the pattern of predictions in the table that follows (U = prediction of an up-market, D = prediction of a down-market).

After three years, no matter what has happened to the market, one of the newsletters would have had a perfect prediction record. This is because after three years there are $2^3 = 8$ outcomes for the market, and we have covered all eight possibilities with the eight newsletters. Now, we simply slough off the seven unsuccessful newsletters, and market the eighth newsletter based on its perfect track record. If we want to establish a newsletter with a perfect track record over a four-year period, we need $2^4 = 16$ newsletters. A five-year period requires 32 newsletters, and so on.

After the fact, the one newsletter that was always right will attract attention for your uncanny foresight and investors will rush to pay large fees for its advice. Your fortune is made, and you have never even researched the market!

**WARNING:** This scheme is illegal! The point, however, is that with hundreds of market newsletters, you can find one that has stumbled onto an apparently remarkable string of successful predictions without any real degree of skill. After the fact, someone’s prediction history can seem to imply great forecasting skill. This person is the one we will read about in The Wall Street Journal; the others will be forgotten.

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**Newsletter Predictions**
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With these caveats in mind, we turn now to some of the empirical tests of the efficient market hypothesis.

Fidelity’s Magellan Fund outperformed the S&P 500 in 11 of the 13 years that Peter Lynch managed the fund, resulting in an average annual return more than 10% better than that of the index. Is Lynch’s performance sufficient to dissuade you from a belief in efficient markets? If not, would any performance record be sufficient to dissuade you?

Tests of Predictability in Stock Market Returns

Returns over Short Horizons Early tests of efficient market were tests of the weak form. Could speculators find trends in past prices that would enable them to earn abnormal profits? This is essentially a test of the efficacy of technical analysis. The already cited work of Kendall and of Roberts, both of whom analyzed the possible existence of patterns in stock prices, suggests that such patterns are not to be found.

One way of discerning trends in stock prices is by measuring the serial correlation of stock market returns. Serial correlation refers to the tendency for stock returns to be related to past returns. Positive serial correlation means that positive returns tend to follow positive returns (a momentum type of property). Negative serial correlation means that positive returns tend to be followed by negative returns (a reversal or “correction” property). Both Conrad and Kaul and Lo and MacKinlay examine weekly returns of NYSE stocks and find positive serial correlation over short horizons. However, the correlation coefficients of weekly returns tend to be fairly small, at least for large stocks for which price data are the most reliably up-to-date. Thus, while these studies demonstrate weak price trends over short periods, the evidence does not clearly suggest the existence of trading opportunities.

A more sophisticated version of trend analysis is a filter rule. A filter technique gives a rule for buying or selling a stock depending on past price movements. One rule, for example, might be: “Buy if the last two trades each resulted in a stock price increase.” A more conventional one might be: “Buy a security if its price increased by 1%, and hold it until its price falls by more than 1% from the subsequent high.” Alexander and Fama and Blume found that such filter rules generally could not generate trading profits.

These very-short-horizon studies suggest momentum in stock market prices, albeit of a magnitude that may be too small to exploit. However, in an investigation of intermediate-horizon stock price behavior (using 3- to 12-month holding periods), Jegadeesh and Titman found that stocks exhibit a momentum property in which good or bad recent performance continues. They conclude that while the performance of individual stocks is highly unpredictable, portfolios of the best-performing stocks in the recent past appear to outperform other stocks with enough reliability to offer profit opportunities.

Returns over Long Horizons  Although studies of short-horizon returns have detected modest positive serial correlation in stock market prices, tests of long-horizon returns (i.e., returns over multiyear periods) have found suggestions of pronounced negative long-term serial correlation. The latter result has given rise to a “fads hypothesis,” which asserts that stock prices might overreact to relevant news. Such overreaction leads to positive serial correlation (momentum) over short time horizons. Subsequent correction of the overreaction leads to poor performance following good performance and vice versa. The corrections mean that a run of positive returns eventually will tend to be followed by negative returns, leading to negative serial correlation over longer horizons. These episodes of apparent overshooting followed by correction give stock prices the appearance of fluctuating around their fair values.

These long-horizon results are dramatic, but the studies offer far from conclusive evidence regarding efficient markets. First, the study results need not be interpreted as evidence for stock market fads. An alternative interpretation of these results holds that they indicate only that market risk premiums vary over time. The response of market prices to variation in the risk premium can lead one to incorrectly infer the presence of mean reversion and excess volatility in prices. For example, when the risk premium and the required return on the market rises, stock prices will fall. When the market then rises (on average) at this higher rate of return, the data convey the impression of a stock price recovery. The impression of overshooting and correction is in fact no more than a rational response of market prices to changes in discount rates.

Second, these studies suffer from statistical problems. Because they rely on returns measured over long time periods, these tests of necessity are based on few observations of long-horizon returns. Moreover, it appears that much of the statistical support for mean reversion in stock market prices derives from returns during the Great Depression. Other periods do not provide strong support for the fads hypothesis.

Predictors of Broad Market Returns  Several studies have documented the ability of easily observed variables to predict market returns. For example, Fama and French showed that the return on the aggregate stock market tends to be higher when the dividend/price ratio, the dividend yield, is high. Campbell and Shiller found that the earnings yield can predict market returns. Keim and Stambaugh showed that bond market data such as the spread between yields on high- and low-grade corporate bonds also help predict broad market returns.

Again, the interpretation of these results is difficult. On the one hand, they may imply that stock returns can be predicted, in violation of the efficient market hypothesis. More probably, however, these variables are proxying for variation in the market risk premium. For example, given a level of dividends or earnings, stock prices will be lower and dividend and earnings yields will be higher when the risk premium (and therefore the expected market return) is higher. Thus a high dividend or earnings yield will be associated with higher market returns.

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This does not indicate a violation of market efficiency. The predictability of market returns is due to predictability in the risk premium, not in risk-adjusted abnormal returns.

Fama and French\(^1\) showed that the yield spread between high- and low-grade bonds has greater predictive power for returns on low-grade bonds than for returns on high-grade bonds, and greater predictive power for stock returns than for bond returns, suggesting that the predictability in returns is in fact a risk premium rather than evidence of market inefficiency. Similarly, the fact that the dividend yield on stocks helps to predict bond market returns suggests that the yield captures a risk premium common to both markets rather than mispricing in the equity market.

**Portfolio Strategies and Market Anomalies**

Fundamental analysis calls on a much wider range of information to create portfolios than does technical analysis, and tests of the value of fundamental analysis are thus correspondingly more difficult to evaluate. They have, however, revealed a number of so-called anomalies, that is, evidence that seems inconsistent with the efficient market hypothesis. We will review several such anomalies in the following pages.

We must note before starting that one major problem with these tests is that most require risk adjustments to portfolio performance and most tests use the CAPM to make the risk adjustments. Although beta seems to be a relevant descriptor of stock risk, the empirically measured quantitative trade-off between risk as measured by beta and expected return differs from the predictions of the CAPM. (We review this evidence in the next chapter.) If we use the CAPM to adjust portfolio returns for risk, inappropriate adjustments may lead to the conclusion that various portfolio strategies can generate superior returns, when in fact it simply is the risk adjustment procedure that has failed.

Another way to put this is to note that tests of risk-adjusted returns are joint tests of the efficient market hypothesis and the risk adjustment procedure. If it appears that a portfolio strategy can generate superior returns, we must then choose between rejecting the EMH and rejecting the risk adjustment technique. Usually, the risk adjustment technique is based on more questionable assumptions than is the EMH; by opting to reject the procedure, we are left with no conclusion about market efficiency.

An example of this issue is the discovery by Basu\(^2\) that portfolios of low price/earnings ratio stocks have higher returns than do high P/E portfolios. The P/E effect holds up even if returns are adjusted for portfolio beta. Is this a confirmation that the market systematically misprices stocks according to P/E ratio? This would be an extremely surprising and, to us, disturbing conclusion, because analysis of P/E ratios is such a simple procedure. Although it may be possible to earn superior returns using hard work and much insight, it hardly seems possible that such a simplistic technique is enough to generate abnormal returns. One possible interpretation of these results is that the model of capital market equilibrium is at fault in that the returns are not properly adjusted for risk.

This makes sense, because if two firms have the same expected earnings, then the riskier stock will sell at a lower price and lower P/E ratio. Because of its higher risk, the low P/E stock also will have higher expected returns. Therefore, unless the CAPM beta fully adjusts for risk, P/E will act as a useful additional descriptor of risk, and will be associated with abnormal returns if the CAPM is used to establish benchmark performance.

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The Small-Firm-in-January Effect

One of the most important anomalies with respect to the efficient market hypothesis is the so-called size or small-firm effect, originally documented by Banz. Figure 12.7 illustrates the size effect. It shows the historical performance of portfolios formed by dividing the NYSE stocks into 10 portfolios each year according to firm size (i.e., the total value of outstanding equity). Average annual returns are consistently higher on the small-firm portfolios. The difference in average annual return between portfolio 10 (with the largest firms) and portfolio 1 (with the smallest firms) is 8.59%. Of course, the smaller-firm portfolios tend to be riskier. But even when returns are adjusted for risk using the CAPM, there is still a consistent premium for the smaller-sized portfolios. Even on a risk-adjusted basis, the smallest-size portfolio outperforms the largest-firm portfolio by an average of 4.3% annually.

This is a huge premium; imagine earning a premium of this size on a billion-dollar portfolio. Yet it is remarkable that following a simple (even simplistic) rule such as “invest in low-capitalization stocks” should enable an investor to earn excess returns. After all, any investor can measure firm size at little cost. One would not expect such minimal effort to yield such large rewards.

Later studies (Keim, Reinganum, and Blume and Stambaugh) showed that the small-firm effect occurs virtually entirely in January, in fact, in the first two weeks of January. The size effect is in fact a “small-firm-in-January” effect.

Some researchers believe that the January effect is tied to tax-loss selling at the end of the year. The hypothesis is that many people sell stocks that have declined in price during the previous months to realize their capital losses before the end of the tax year. Such investors do not put the proceeds from these sales back into the stock market until after the turn of the year. At that point the rush of demand for stock places an upward pressure on prices that results in the January effect. Indeed, Ritter showed that the ratio of stock purchases to sales of individual investors reaches an annual low at the end of December and an annual high at the beginning of January.

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Figure 12.7 Returns in excess of risk-free rate and in excess of the Security Market Line for 10 size-based portfolios.

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The January effect is said to show up most dramatically for the smallest firms because the small-firm group includes, as an empirical matter, stocks with the greatest variability of prices during the year. The group therefore includes a relatively large number of firms that have declined sufficiently to induce tax-loss selling.

From a theoretical standpoint, this theory has substantial flaws. First, if the positive January effect is a manifestation of buying pressure, it should be matched by a symmetric negative December effect when the tax-loss incentives induce selling pressure. Second, the predictable January effect flies in the face of efficient market theory. If investors who do not already hold these firms know that January will bring abnormal returns to the small-firm group, they should rush to purchase stock in December to capture those returns. This would push buying pressure from January to December. Rational investors should not “allow” such predictable abnormal January returns to persist. However, small firms outperform large ones in January in every year of Keim’s study, 1963 to 1979.

Despite these theoretical objections, some empirical evidence supports the belief that the January effect is connected to tax-loss selling. For example, Reinganum found that, within size class, firms that had declined more severely in price had larger January returns.

The Neglected-Firm Effect and Liquidity Effects Arbel and Strebel gave another interpretation of the small-firm-in-January effect. Because small firms tend to be neglected by large institutional traders, information about smaller firms is less available. This information deficiency makes smaller firms riskier investments that command higher returns. “Brand-name” firms, after all, are subject to considerable monitoring from institutional investors, which promises high-quality information, and presumably investors do not purchase “generic” stocks without the prospect of greater returns.

As evidence for the neglected-firm effect, Arbel divided firms into highly researched, moderately researched, and neglected groups based on the number of institutions holding the stock. The January effect was in fact largest for the neglected firms. Work by Amihud and Mendelson on the effect of liquidity on stock returns might be related to both the small-firm and neglected-firm effects. They argue that investors will demand a rate-of-return premium to invest in less-liquid stocks that entail higher trading costs. (See Chapter 9 for more details.) Indeed, spreads for the least-liquid stocks easily can be more than 5% of stock value. In accord with their hypothesis, Amihud and Mendelson showed that these stocks show a strong tendency to exhibit abnormally high risk-adjusted rates of return. Because small and less-analyzed stocks as a rule are less liquid, the liquidity effect might be a partial explanation of their abnormal returns. However, this theory does not explain why the abnormal returns of small firms should be concentrated in January. In any case, exploiting these effects can be more difficult than it would appear. The high trading costs on small stocks can easily wipe out any apparent abnormal profit opportunity.

Book-to-Market Ratios Fama and French and Reinganum showed that a powerful predictor of returns across securities is the ratio of the book value of the firm’s equity to the market value of equity. Fama and French stratified firms into 10 groups according

to book-to-market ratios and examined the average monthly rate of return of each of the 10 groups during the period July 1963 through December 1990. The decile with the highest book-to-market ratio had an average monthly return of 1.65%, while the lowest-ratio decile averaged only .72% per month. Figure 12.8 shows the pattern of returns across deciles. The dramatic dependence of returns on book-to-market ratio is independent of beta, suggesting either that high book-to-market ratio firms are relatively underpriced, or that the book-to-market ratio is serving as a proxy for a risk factor that affects equilibrium expected returns.

In fact, Fama and French found that after controlling for the size and book-to-market effects, beta seemed to have no power to explain average security returns. This finding is an important challenge to the notion of rational markets, since it seems to imply that a factor that should affect returns—systematic risk—seems not to matter, while a factor that should not matter—the book-to-market ratio—seems capable of predicting future returns. We will return to the interpretation of this anomaly.

Reversals While some of the studies cited earlier suggest momentum in stock market prices over horizons of less than one year, many other studies suggest that over longer horizons, extreme stock market performance tends to reverse itself: The stocks that have performed best in the recent past seem to underperform the rest of the market in following periods, while the worst past performers tend to offer above-average future performance. DeBondt and Thaler30 and Chopra, Lakonishok, and Ritter31 find strong tendencies for poorly performing stocks in one period to experience sizable reversals over the subsequent period, while the best-performing stocks in a given period tend to follow with poor performance in the following period.

29 However, a study by S. P. Kothari, Jay Shanken, and Richard G. Sloan, “Another Look at the Cross-Section of Expected Stock Returns,” Journal of Finance 50 (March 1995), pp. 185–224, finds that when betas are estimated using annual rather than monthly returns, securities with high beta values do in fact have higher average returns. Moreover, the authors find a book-to-market effect that is attenuated compared to the results in Fama and French and furthermore is inconsistent across different samples of securities. They conclude that the empirical case for the importance of the book-to-market ratio may be somewhat weaker than the Fama and French study would suggest.


For example, the DeBondt and Thaler study found that if one were to rank order the performance of stocks over a five-year period and then group stocks into portfolios based on investment performance, the base-period “loser” portfolio (defined as the 35 stocks with the worst investment performance) outperformed the “winner” portfolio (the top 35 stocks) by an average of 25% (cumulative return) in the following three-year period. This reversal effect, in which losers rebound and winners fade back, suggests that the stock market overreacts to relevant news. After the overreaction is recognized, extreme investment performance is reversed. This phenomenon would imply that a contrarian investment strategy—investing in recent losers and avoiding recent winners—should be profitable.

It would be hard to explain apparent overreaction in the cross section of stocks by appealing to time-varying risk premiums. Moreover, these returns seem pronounced enough to be exploited profitably.

However, a study by Ball, Kothari, and Shanken suggests that the reversal effect may be overstated. They showed that if portfolios are formed by grouping based on past performance periods ending in mid-year rather than in December (a variation in grouping strategy that ought to be unimportant), the reversal effect is substantially diminished. Moreover, the reversal effect seems to be concentrated in very low-priced stocks (e.g., prices of less than $1 per share), for which a bid–asked spread of even $1/8 (the minimum tick size until 1997) can have a profound impact on measured return, and for which a liquidity effect may explain high average returns. Finally, the risk-adjusted return of the contrarian strategy actually turns out to be statistically indistinguishable from zero, suggesting that the reversal effect is not an unexploited profit opportunity.

The reversal effect also seems to be dependent on the time horizon of the investment. DeBondt and Thaler found reversals over long (multiyear) horizons, and studies by Jegadeesh and Lehmann documented reversals over short horizons of a month or less. However, as we saw above, an investigation of intermediate-horizon stock price behavior (using 3- to 12-month holding periods) by Jegadeesh and Titman found that stocks exhibit a momentum property in which good or bad recent performance continues. This of course is the opposite of a reversal phenomenon.

Thus it appears that there may be short-run momentum but long-run reversal patterns in price behavior. One interpretation of this pattern is that short-run overreaction (which causes momentum in prices) may lead to long-term reversals (when the market recognizes its past error). This interpretation is emphasized by Haugen.

**Risk Premiums or Anomalies?**

The price-earnings, small-firm, market-to-book, and long-term reversal effects are currently among the most puzzling phenomena in empirical finance. There are several interpretations of these effects. First note that to some extent, these three phenomena may be related. The feature that small firms, low-market-to-book firms, and recent “losers” seem to have in common is a stock price that has fallen considerably in recent months or years.

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33 This may explain why the choice of year-end versus mid-year grouping has such a significant impact on the results. Other studies have shown that close-of-year prices on the loser stocks are more likely to be quoted at the bid price. As a result, their initial prices are on average understated, and performance in the follow-up period is correspondingly overstated.


Indeed, a firm can become a small firm or a low-market-to-book firm by suffering a sharp drop in price. These groups therefore may contain a relatively high proportion of distressed firms that have suffered recent difficulties.

Fama and French argue that these effects can be explained as manifestations of risk premiums. Using an arbitrage pricing type of model they show that stocks with higher “betas” (also known as factor loadings) on size or market-to-book factors have higher average returns; they interpret these returns as evidence of a risk premium associated with the factor. Fama and French propose a three-factor model, in the spirit of arbitrage pricing theory. Risk is determined by the sensitivity of a stock to three factors: (1) the market portfolio, (2) a portfolio that reflects the relative returns of small versus large firms, and (3) a portfolio that reflects the relative returns of firms with high versus low ratios of book value to market value. This model does a good job in explaining security returns. While size or book-to-market ratios per se are obviously not risk factors, they perhaps might act as proxies for more fundamental determinants of risk. Fama and French argue that these patterns of returns may therefore be consistent with an efficient market in which expected returns are consistent with risk. We examine this paper in more detail in the next chapter.

The opposite interpretation is offered by Lakonishok, Shleifer, and Vishney, who argue that these phenomena are evidence of inefficient markets, more specifically, of systematic errors in the forecasts of stock analysts. They believe that analysts extrapolate past performance too far into the future, and therefore overprice firms with recent good performance and underprice firms with recent poor performance. Ultimately, when market participants recognize their errors, prices reverse. This explanation is consistent with the reversal effect and also, to a degree, is consistent with the small-firm and book-to-market effects because firms with sharp price drops may tend to be small or have high book-to-market ratios.

If Lakonishok, Shleifer, and Vishney are correct, we ought to find that analysts systematically err when forecasting returns of recent “winner” versus “loser” firms. A study by La Porta is consistent with this pattern. He finds that equity of firms for which analysts predict low growth rates of earnings actually perform better than those with high expected earnings growth. Analysts seem overly pessimistic about firms with low growth prospects and overly optimistic about firms with high growth prospects. When these too-extreme expectations are “corrected,” the low-expected-growth firms outperform high-expected-growth firms.

Daniel and Titman attempt to test whether the size and book-to-market effects can in fact be explained as risk premia. They first classify firms according to size and book-to-market ratio, and then further stratify portfolios based on the betas of each stock on size and book-to-market factors. They find that once size and book-to-market ratio are held fixed, the betas on these factors do not add any additional information about expected returns. They conclude that the characteristics per se, and not the betas on the size or book-to-market factors influence returns. This result is inconsistent with the Fama-French interpretation that the high returns on these portfolios may reflect risk premia.

The Daniel and Titman results do not necessarily imply irrational markets. As noted, it might be that these characteristics per se measure a distressed condition that itself

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commands a return premium. Moreover, as we have noted, a good part of these apparently abnormal returns may be reflective of an illiquidity premium since small and low-priced firms tend to have bigger bid-asked spreads. Nevertheless, a compelling explanation of these results has yet to be offered.

Inside Information It would not be surprising if insiders were able to make superior profits trading in their firm’s stock. The ability of insiders to trade profitably in their own stock has been documented in studies by Jaffe,41 Seyhun,42 Givoly and Palmon,43 and others. Jaffe’s was one of the earlier studies that documented the tendency for stock prices to rise after insiders intensively bought shares and to fall after intensive insider sales.

Can other investors benefit by following insiders’ trades? The Securities and Exchange Commission requires all insiders to register their trading activity. The SEC publishes these trades in an Official Summary of Insider Trading. Once the Official Summary is published, the knowledge of the trades becomes public information. At that point, if markets are efficient, fully and immediately processing the information released in the Official Summary of trading, an investor should no longer be able to profit from following the pattern of those trades.

The study by Seyhun, which carefully tracked the public release dates of the Official Summary, found that following insider transactions would be to no avail. Although there is some tendency for stock prices to increase even after the Official Summary reports insider buying, the abnormal returns are not of sufficient magnitude to overcome transaction costs.

Post–Earnings-Announcement Price Drift A fundamental principle of efficient markets is that any new information ought to be reflected in stock prices very rapidly. When good news is made public, for example, the stock price should jump immediately. A puzzling anomaly, therefore, is the apparently sluggish response of stock prices to firms’ earnings announcements.

The “news content” of an earnings announcement can be evaluated by comparing the announcement of actual earnings to the value previously expected by market participants. The difference is the “earnings surprise.” (Market expectations of earnings can be roughly measured by averaging the published earnings forecasts of Wall Street analysts or by applying trend analysis to past earnings.) Foster, Olsen, and Shevlin44 have examined the impact of earnings announcements on stock returns.

Each earnings announcement for a large sample of firms was placed in 1 of 10 deciles ranked by the magnitude of the earnings surprise, and the abnormal returns of the stock in each decile were calculated. The abnormal return in a period is the return of a portfolio of all stocks in a given decile after adjusting for both the market return in that period and the portfolio beta. It measures return over and above what would be expected given market conditions in that period. Figure 12.9 is a graph of the cumulative abnormal returns for each decile.

The results of this study are dramatic. The correlation between ranking by earnings surprise and abnormal returns across deciles is as predicted. There is a large abnormal return (a large increase in cumulative abnormal return) on the earnings announcement.

day (time 0). The abnormal return is positive for positive-surprise firms and negative for negative-surprise firms.

The more remarkable, and interesting, result of the study concerns stock price movement after the announcement date. The cumulative abnormal returns of positive-surprise stocks continue to grow even after the earnings information becomes public, while the negative-surprise firms continue to suffer negative abnormal returns. The market appears to adjust to the earnings information only gradually, resulting in a sustained period of abnormal returns.

Evidently, one could have earned abnormal profits simply by waiting for earnings announcements and purchasing a stock portfolio of positive-earnings-surprise companies. These are precisely the types of predictable continuing trends that ought to be impossible in an efficient market.

**Anomalies or Data Mining?** We have covered many of the so-called anomalies cited in the literature, but our list could go on and on. Some wonder whether these anomalies are really unexplained puzzles in financial markets, or whether they instead are an artifact of data mining. After all, if one reruns the computer database of past returns over and over and examines stock returns along enough dimensions, simple chance will cause some criteria to appear to predict returns.

Still, even acknowledging the potential for data mining, a common thread seems to run through many of the anomalies we have considered, lending support to the notion that there is a real puzzle to explain. Value stocks—defined by low P/E ratio, high book-to-market ratio, or depressed prices relative to historic levels—seem to have provided higher average returns than “glamour” or growth stocks.
One way to address the problem of data mining is to find a data set that has not already been researched and see whether the relationship in question shows up in the new data. Such studies have revealed size, momentum, and book-to-market effects in other security markets around the world. While these phenomena may be a manifestation of a systematic risk premium, the precise nature of that risk is not fully understood.

A Behavioral Interpretation

Those who believe that the anomalies literature is in fact an indication of investor irrationality sometimes refer to evidence from research in the psychology of decision making. Psychologists have identified several “irrationalities” that seem to characterize individuals making complex decisions. Here is a sample of some of these irrationalities and some anomalies with which they might be consistent.45

1. Forecasting errors. A series of experiments by Kahneman and Tversky46 indicate that people give too much weight to recent experience compared to prior beliefs when making forecasts, and tend to make forecasts that are too extreme given the uncertainty inherent in their information. DeBondt and Thaler47 argue that the P/E effect can be explained by earnings expectations that are too extreme. In this view, when forecasts of a firm’s future earnings are high, they tend to be too high relative to the objective prospects of the firm. This results in a high initial P/E (due to the optimism built into the stock price) and poor subsequent performance when investors recognize their error. Thus, high P/E firms tend to be poor investments.

2. Overconfidence. People tend to underestimate the imprecision of their beliefs or forecasts, and they tend to overestimate their abilities. In one famous survey, 90% of drivers in Sweden ranked themselves as better-than-average drivers. Such overconfidence may be responsible for the prevalence of active versus passive investment management—itself an anomaly to an adherent of the efficient market hypothesis. Despite the recent growth in indexing, less than 10% of the equity in the mutual fund industry is held in indexed accounts. The dominance of active management in the face of the typical underperformance of such strategies (consider the disappointing performance of actively managed mutual funds documented in Chapter 4 as well as in the following pages) is consistent with a tendency to overestimate ability.

3. Regret avoidance. Psychologists have found that individuals who make decisions that turn out badly have more regret (blame themselves more) when that decision was more unconventional. For example, buying a blue-chip portfolio that turns down is not as painful as experiencing the same losses on an unknown start-up firm. Any losses on the blue-chip stocks can be more easily attributed to bad luck rather than bad decision making and cause less regret. De Bondt and Thaler48 argue that such regret theory is consistent with both the size and book-to-market effect. Higher book-to-market firms tend to have lower stock prices. These firms are “out

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of favor” and more likely to be in a financially precarious position. Similarly, smaller less-well-known firms are also less conventional investments. Such firms require more “courage” on the part of the investor, which increases the required rate of return.

4. Framing and mental accounting. Decisions seem to be affected by how choices are framed. For example, an individual may reject a bet when it is posed in terms of possible losses but may accept that same bet when described in terms of potential gains. Mental accounting is another form of framing in which people segregate certain decisions. For example, an investor may take a lot of risk with one investment account but establish a very conservative position with another account that is dedicated to her child’s education. Rationally, it might be better to view both accounts as part of the investor’s overall portfolio with the risk-return profiles of each integrated into a unified framework. Statman argues that mental accounting is consistent with some investors’ irrational preference for stocks with high cash dividends (they feel free to spend dividend income, but will not “dip into capital” by selling a few shares of another stock with the same total rate of return), and with a tendency to ride losing stock positions for too long (since “behavioral investors” are reluctant to realize losses).

The nearby box offers good examples of several of these psychological tendencies in an investments setting.

**Mutual Fund Performance** We have documented some of the apparent chinks in the armor of efficient market proponents. Ultimately, however, the issue of market efficiency boils down to whether skilled investors can make consistent abnormal trading profits. The best test is to look at the performance of market professionals to see if their performance is superior to that of a passive index fund that buys and holds the market.

As we pointed out in Chapter 4, casual evidence does not support the claim that professionally managed portfolios can consistently beat the market. Figures 4.3 and 4.4 in that chapter demonstrated that between 1972 and 1999 the returns of a passive portfolio indexed to the Wilshire 5000 typically would have been better than those of the average equity fund. On the other hand, there was some (admittedly inconsistent) evidence (see Table 4.3) of persistence in performance, meaning that the better managers in one period tended to be better managers in following periods. Such a pattern would suggest that the better managers can with some consistency outperform their competitors, and it would be inconsistent with the notion that market prices already reflect all relevant information.

The analyses cited in Chapter 4 were based on total returns; they did not properly adjust returns for exposure to systematic risk factors. In this section we revisit the question of mutual fund performance, paying more attention to the benchmark against which performance ought to be evaluated.

As a first pass, we can examine the risk-adjusted returns (i.e., the alpha, or return in excess of required return based on beta and the market return in each period) of a large sample of mutual funds. Malkiel computed these abnormal returns for a large sample of mutual funds between 1972 and 1991. His results, which appear in Figure 12.10, show that the distribution of alphas is roughly bell shaped, with a mean that is slightly negative but statistically indistinguishable from zero.

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When stock-market investors take a hit, they rail at their stupidity and question their investment strategy. But when lottery ticket buyers lose, they shrug off their bad luck and pony up for another ticket.

Maybe those lottery players have the right idea.

Sure, if you lose a bundle in the stock market, it could be your fault. But there is a fair chance that the real culprits are bad luck and skewed expectations.

Examples? Consider these three:

**Picking on Yourself:** If one of your stocks craters, that doesn’t necessarily mean you are a fool and that your investment research was inadequate. By the same token, a soaring stock doesn’t make you a genius. The fact is, the stock market is pretty darn efficient.

“When people buy stocks, they think they are playing a game of skill,” says Meir Statman, a finance professor at Santa Clara University in California. “When the stock goes down rather than up, they think they have lost their knack. But they should take heart. All they have lost is luck. And next time, when the stock goes up, they should remember that that was luck, too.”

**All Over the Map:** Just as your portfolio likely will include a fair number of losing stocks, so you may have exposure to stock-market sectors that post lackluster returns for long periods. Were you wrong to invest in those sectors? Probably not.

“In the 1990s, U.S. stocks beat international stocks,” notes William Retchenstein, an investments professor at Baylor University in Waco, Texas. “That doesn’t mean international diversification isn’t needed or doesn’t work. International diversification is about reducing risk before the fact. In 1990, no one knew that the U.S. would be the hottest market for the decade. Similarly, today no one knows which region will be the hottest market. That’s why we diversify.

“People say, ‘My investment adviser didn’t get me out of tech stocks in time, so I’m going to fire him.’” Mr. Retchenstein says, “The assumption is that you can successfully pick sectors. But nobody can do that.”

**Timing Patterns:** Did you load up on stocks, only to see the market tank? Don’t feel bad. Short-run market activity is utterly unpredictable. That is why investors who buy stocks need a long time horizon.

“When people buy and the market goes down, that is when regret hits the most, because they can easily imagine postponing the purchase,” Mr. Statman says. “People feel that the market is picking on them personally.” But in truth, buying stocks ahead of a market decline is just bad luck.

Similarly, folks can also draw the wrong lesson from their successes. For instance, if you made a brilliantly timed switch between stocks and cash, that may bolster your self-confidence and make you think you are smarter than you really are.

Once you accept that investment gains and losses are often the result of luck rather than brains, you may find it easier to cope with market turmoil. But what if you still kick yourself with every investment loss? A financial adviser could come in handy. Sure, the cost involved will hurt your investment returns. But there is a little-mentioned benefit.

“Investors use advisors as scapegoats, blaming them for all the stocks that went down while claiming credit themselves for all the stocks that went up,” Mr. Statman says. “In an odd way, when people hire advisers, they get their money’s worth.”

index after adjusting for systematic risk was –4%). In the more recent 20-year period between 1965 and 1984, small stocks outperformed the S&P index by 10%. Thus if one were to examine mutual fund returns in the earlier period, they would tend to look poor, not necessarily because small-fund managers were poor stock pickers, but simply because mutual funds as a group tend to hold more small stocks than are represented in the S&P 500. In the later period, funds would look better on a risk-adjusted basis relative to the S&P 500 because small funds performed better. The “style choice,” that is, the exposure to small stocks (which is an asset allocation decision) would dominate the evaluation of performance even though it has little to do with managers’ stock-picking ability.52

Elton, Gruber, Das, and Hlavka attempted to control for the impact of non–S&P assets on mutual fund performance. They used a multifactor version of the index model of security returns (see equation 10.3) and calculated fund alphas using regressions that include as explanatory variables the excess returns of three benchmark portfolios rather than just one proxy for the market index. Their three factors are the excess return on the S&P 500 index, the excess return on an equity index of non–S&P low capitalization (i.e., small) firms, and the excess return on a bond market index. Some of their results are presented in Table 12.1, which shows that average alphas are negative for each type of equity fund, although generally not of statistically significant magnitude. They concluded that after controlling for the relative performance of these three asset classes—large stocks, small stocks, and bonds—mutual fund managers as a group do not demonstrate an ability to beat passive index strategies that would simply mix index funds from among these asset classes. They also found that mutual fund performance is worse for firms that have higher expense ratios and higher turnover ratios. Thus it appears that funds with higher fees do not increase gross returns by enough to justify those fees.

Carhart53 reexamined the issue of consistency in mutual fund performance—sometimes called the “hot hands” phenomenon—controlling for non–S&P factors in a manner similar

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52 Remember that the asset allocation decision is usually in the hands of the individual investor. Investors allocate their investment portfolios to funds in asset classes they desire to hold, and they can reasonably expect only that mutual fund portfolio managers will choose stocks advantageously within those asset classes.

to Elton, Gruber, Das, and Hlavka. Carhart used a four-factor extension of the index model in which the four benchmark portfolios are the S&P 500 index and portfolios based on book-to-market ratio, size, and prior-year stock market return. These portfolios capture the impacts of three anomalies discussed earlier: the small-firm effect, the book-to-market effect, and the intermediate-term price momentum documented by Jegadeesh and Titman (cited in footnote 12).

Carhart found that there is some persistence in relative performance across managers. However, much of that persistence seems due to expenses and transactions costs rather than gross investment returns. This last point is important; while there can be no consistently superior performers in a fully efficient market, there can be consistently inferior performers. Repeated weak performance would not be due to an ability to pick bad stocks consistently (that would be impossible in an efficient market!) but could result from a consistently high expense ratio, high portfolio turnover, or higher-than-average transaction costs per trade. In this regard, it is interesting that in another study documenting apparent consistency across managers, Hendricks, Patel, and Zeckhauser54 also found the strongest consistency among the weakest performers.

Even allowing for expenses and turnover, some amount of performance persistence seems to be due to differences in investment strategy. Carhart found, however, that the evidence of persistence is concentrated at the two extremes. Figure 12.11 from Carhart’s study documents performance persistence. Equity funds are ranked into one of 10 groups by performance in the formation year, and the performance of each group in the following years is plotted. It is clear that except for the best-performing top-decile group and the worst-performing 10th decile group, performance in future periods is almost independent of earlier-year returns. Carhart’s results suggest that there may be a small group of exceptional managers who can with some consistency outperform a passive strategy, but that for the majority of managers over- or underperformance in any period is largely a matter of chance.

In contrast to the extensive studies of equity fund managers, there have been few studies on the performance of bond fund managers. Blake, Elton, and Gruber55 examined the

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performance of fixed-income mutual funds. They found that, on average, bond funds underperform passive fixed-income indexes by an amount roughly equal to expenses, and that there is no evidence that past performance can predict future performance. Their evidence is consistent with the hypothesis that bond managers operate in an efficient market in which performance before expenses is only as good as that of a passive index.

Thus the evidence on the risk-adjusted performance of professional managers is mixed at best. We conclude that the performance of professional managers is broadly consistent with market efficiency. The amounts by which professional managers as a group beat or are beaten by the market fall within the margin of statistical uncertainty. In any event, it is quite clear that performance superior to passive strategies is far from routine. Studies show either that most managers cannot outperform passive strategies, or that if there is a margin of superiority, it is small.

On the other hand, a small number of investment superstars—Peter Lynch (formerly of Fidelity’s Magellan Fund), Warren Buffet (of Berkshire Hathaway), John Templeton (of Templeton Funds), and John Neff (of Vanguard’s Windsor Fund) among them—have compiled career records that show a consistency of superior performance hard to reconcile with absolutely efficient markets. Nobel Prize winner Paul Samuelson\(^56\) reviewed this investment hall of fame but pointed out that the records of the vast majority of professional managers reviewed by him make the idea of an efficient market “look very plausible.”

TRY LUCK—AND ASK THE RIGHT QUESTIONS

As manager of Fidelity Magellan Fund from 1977 to 1990, Peter Lynch made a lot of money for shareholders. But he did a big disservice to everybody else.

How so? Mr. Lynch had an astonishing 13-year run, beating the market in every calendar year but two. He gave hope to amateur investors, who had tried picking stocks themselves and failed. Now they had a new strategy: Instead of picking stocks, they would pick the managers who picked the stocks.

That was the theory. The reality? Every day, thousands of amateur investors, fund analysts, investment advisers and financial journalists pore over the country’s 4,000-plus stock funds all looking for the next Peter Lynch.

They are still looking.

Falling Stars

The 44 Wall Street Fund was also a dazzling performer in the 1970s. In the 1970s, 44 Wall Street generated even higher returns than Magellan and it ranked as the third-best-performing stock fund. But the 1980s weren’t quite so kind. It ranked as the worst fund in the 1980s, losing 73.1%. Past performance may be a guide to future results. But it’s a mighty tough guide to read.


If a manager specializes in, say, blue-chip growth stocks, eventually these shares will catch the market’s fancy and—providing the manager doesn’t do anything too silly—three or four years of market-beating performance might follow. This strong performance catches the media’s attention and the inevitable profile follows, possibly in Forbes or Money or SmartMoney. By the time the story reaches print, our manager comes across as opinionated and insightful. The money starts rolling in. That’s when blue-chip growth stocks go out of favor. You can guess the rest.

Five Questions

I think it is possible to identify winning managers. But the odds are stacked against you. Over a 10-year period, maybe only a quarter of diversified U.S. stock funds will beat Standard & Poor’s 500-stock index, which is why market-tracking index funds make so much sense.

So if you are going to try to identify star managers, what should you do? First, stack the odds in your favor by avoiding funds with high annual expenses and sales commissions. Then kick the tires on those funds that remain. Here are five questions to ask:

• Does the fund make sense for your portfolio?

Start by deciding what sort of stock funds you want. You might opt to buy a large-company fund, a small-company fund, an international fund and an emerging-markets fund. Having settled on your target mix, then buy the best funds to fill each slot in your portfolio.

• How has the manager performed?

Funds don’t pick stocks. Fund managers do. If a fund has a great record but a new, untested manager, the record is meaningless. By contrast, a spanking new fund with a veteran manager can be a great investment.

• What explains the manager’s good performance?

You want to invest with managers who regularly beat the market by diligently picking one good stock after another. Meanwhile, avoid those who have scored big by switching between stocks and cash or by making hefty bets on one market sector after another.

Why? If a manager performs well by picking stocks, he or she has made the right stock-picking decision on hundreds of occasions, thus suggesting a real skill. By contrast, managers who score big with market timing or sector rotating may have built their record on just half-a-dozen good calls. With such managers, it’s much more difficult to say whether they are truly skillful or just unusually lucky.

• Has the manager performed consistently well?

Look at a manager’s record on a year-by-year basis. By doing so, you can see whether the manager has performed consistently well or whether the record is built on just one or two years of sizzling returns.

• Has the fund grown absurdly large?

As investors pile into a top-ranked fund, its stellar returns inevitably dull because the manager can no longer stick with his or her favorite stocks but instead must spread the fund’s ballooning assets among a growing group of companies.

money managers offer convincing evidence that there are no easy strategies to guarantee success in the securities markets. The nearby box points out the perils of trying to identify the next superstar manager.

**So, Are Markets Efficient?**

There is a telling joke about two economists walking down the street. They spot a $20 bill on the sidewalk. One starts to pick it up, but the other one says, “Don’t bother; if the bill were real someone would have picked it up already.”

The lesson is clear. An overly doctrinaire belief in efficient markets can paralyze the investor and make it appear that no research effort can be justified. This extreme view is probably unwarranted. There are enough anomalies in the empirical evidence to justify the search for underpriced securities that clearly goes on.

The bulk of the evidence, however, suggests that any supposedly superior investment strategy should be taken with many grains of salt. The market is competitive enough that only differentially superior information or insight will earn money; the easy pickings have been picked. In the end it is likely that the margin of superiority that any professional manager can add is so slight that the statistician will not easily be able to detect it.

We conclude that markets are very efficient, but that rewards to the especially diligent, intelligent, or creative may in fact be waiting.

**SUMMARY**

1. Statistical research has shown that to a close approximation stock prices seem to follow a random walk with no discernible predictable patterns that investors can exploit. Such findings are now taken to be evidence of market efficiency, that is, evidence that market prices reflect all currently available information. Only new information will move stock prices, and this information is equally likely to be good news or bad news.

2. Market participants distinguish among three forms of the efficient market hypothesis. The weak form asserts that all information to be derived from past stock prices already is reflected in stock prices. The semistrong form claims that all publicly available information is already reflected. The strong form, which generally is acknowledged to be extreme, asserts that all information, including insider information, is reflected in prices.

3. Technical analysis focuses on stock price patterns and on proxies for buy or sell pressure in the market. Fundamental analysis focuses on the determinants of the underlying value of the firm, such as current profitability and growth prospects. Because both types of analysis are based on public information, neither should generate excess profits if markets are operating efficiently.

4. Proponents of the efficient market hypothesis often advocate passive as opposed to active investment strategies. The policy of passive investors is to buy and hold a broad-based market index. They expend resources neither on market research nor on frequent purchase and sale of stocks. Passive strategies may be tailored to meet individual investor requirements.

5. Event studies are used to evaluate the economic impact of events of interest, using abnormal stock returns. Such studies usually show that there is some leakage of inside information to some market participants before the public announcement date. Therefore, insiders do seem to be able to exploit their access to information to at least a limited extent.

6. Empirical studies of technical analysis do not generally support the hypothesis that such analysis can generate superior trading profits. One notable exception to this conclusion is the apparent success of momentum-based strategies over intermediate-term horizons.
CHAPTER 12 Market Efficiency

7. Several anomalies regarding fundamental analysis have been uncovered. These include the P/E effect, the small-firm-in-January effect, the neglected-firm effect, post-earnings-announcement price drift, the reversal effect, and the book-to-market effect. Whether these anomalies represent market inefficiency or poorly understood risk premia is still a matter of debate.

8. By and large, the performance record of professionally managed funds lends little credence to claims that most professionals can consistently beat the market.

KEY TERMS

random walk
efficient market hypothesis
weak-form EMH
semistrong-form EMH
strong-form EMH
technical analysis
Dow theory
resistance levels
support levels
fundamental analysis
passive investment strategy
index fund
event study
abnormal return
cumulative abnormal return
filter rule
P/E effect
small-firm effect
neglected-firm effect
book-to-market effect
reversal effect

WEBSITES

The website listed below has an online journal entitled Efficient Frontier: An Online Journal of Practical Asset Allocation. The journal contains short articles about various investment strategies that are downloadable in Adobe format.

http://www.efficientfrontier.com

The sites listed below contain information about market efficiency issues related to individual stocks and mutual funds.

http://my.zacks.com
http://www.wsrn.com
http://www.corporateinformation.com
http://www.businessweek.com/investor

PROBLEMS

1. If markets are efficient, what should be the correlation coefficient between stock returns for two nonoverlapping time periods?

2. Which of the following most appears to contradict the proposition that the stock market is weakly efficient? Explain.
   a. Over 25% of mutual funds outperform the market on average.
   b. Insiders earn abnormal trading profits.
   c. Every January, the stock market earns abnormal returns.

3. Suppose that, after conducting an analysis of past stock prices, you come up with the following observations. Which would appear to contradict the weak form of the efficient market hypothesis? Explain.
   a. The average rate of return is significantly greater than zero.
   b. The correlation between the return during a given week and the return during the following week is zero.
   c. One could have made superior returns by buying stock after a 10% rise in price and selling after a 10% fall.
d. One could have made higher-than-average capital gains by holding stocks with low dividend yields.

4. Which of the following statements are true if the efficient market hypothesis holds?
   a. It implies that future events can be forecast with perfect accuracy.
   b. It implies that prices reflect all available information.
   c. It implies that security prices change for no discernible reason.
   d. It implies that prices do not fluctuate.

5. Which of the following observations would provide evidence against the semistrong form of the efficient market theory? Explain.
   a. Mutual fund managers do not on average make superior returns.
   b. You cannot make superior profits by buying (or selling) stocks after the announcement of an abnormal rise in dividends.
   c. Low P/E stocks tend to have positive abnormal returns.
   d. In any year approximately 50% of pension funds outperform the market.

Problems 6–12 are taken from past CFA exams.

6. The semistrong form of the efficient market hypothesis asserts that stock prices:
   a. Fully reflect all historical price information.
   b. Fully reflect all publicly available information.
   c. Fully reflect all relevant information including insider information.
   d. May be predictable.

7. Assume that a company announces an unexpectedly large cash dividend to its shareholders. In an efficient market without information leakage, one might expect:
   a. An abnormal price change at the announcement.
   b. An abnormal price increase before the announcement.
   c. An abnormal price decrease after the announcement.
   d. No abnormal price change before or after the announcement.

8. Which one of the following would provide evidence against the semistrong form of the efficient market theory?
   a. About 50% of pension funds outperform the market in any year.
   b. All investors have learned to exploit signals about future performance.
   c. Trend analysis is worthless in determining stock prices.
   d. Low P/E stocks tend to have positive abnormal returns over the long run.

9. According to the efficient market hypothesis:
   a. High-beta stocks are consistently overpriced.
   b. Low-beta stocks are consistently overpriced.
   c. Positive alphas on stocks will quickly disappear.
   d. Negative alpha stocks consistently yield low returns for arbitrageurs.

10. A “random walk” occurs when:
    a. Stock price changes are random but predictable.
    b. Stock prices respond slowly to both new and old information.
    c. Future price changes are uncorrelated with past price changes.
    d. Past information is useful in predicting future prices.

11. Two basic assumptions of technical analysis are that security prices adjust:
    a. Gradually to new information, and study of the economic environment provides an indication of future market movements.
    b. Rapidly to new information, and study of the economic environment provides an indication of future market movements.
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c. Rapidly to new information, and market prices are determined by the interaction between supply and demand.
d. Gradually to new information, and prices are determined by the interaction between supply and demand.

12. When technical analysts say a stock has good “relative strength,” they mean:
a. The ratio of the price of the stock to a market or industry index has trended upward.
b. The recent trading volume in the stock has exceeded the normal trading volume.
c. The total return on the stock has exceeded the total return on T-bills.
d. The stock has performed well recently compared to its past performance.

13. Which one of the following would be a bullish signal to a technical analyst using contrary opinion rules?
a. The level of credit balances in investor accounts declines.
b. The ratio of bearish investment advisors to the number of advisory services expressing an optimistic opinion is historically quite high.
c. A large proportion of speculators expect the price of stock index futures to rise.
d. The ratio of over the counter (OTC) volume to New York Stock Exchange (NYSE) volume is relatively high.

14. A successful firm like Microsoft has consistently generated large profits for years. Is this a violation of the EMH?

15. Suppose you find that prices of stocks before large dividend increases show on average consistently positive abnormal returns. Is this a violation of the EMH?

16. “If the business cycle is predictable, and a stock has a positive beta, the stock’s returns also must be predictable.” Respond.

17. Which of the following phenomena would be either consistent with or a violation of the efficient market hypothesis? Explain briefly.
a. Nearly half of all professionally managed mutual funds are able to outperform the S&P 500 in a typical year.
b. Money managers that outperform the market (on a risk-adjusted basis) in one year are likely to outperform in the following year.
c. Stock prices tend to be predictably more volatile in January than in other months.
d. Stock prices of companies that announce increased earnings in January tend to outperform the market in February.
e. Stocks that perform well in one week perform poorly in the following week.

18. “If all securities are fairly priced, all must offer equal expected rates of return.” Comment.

19. An index model regression applied to past monthly returns in General Motors’ stock price produces the following estimates, which are believed to be stable over time:

\[ r_{GM} = .10% + 1.1r_M \]

If the market index subsequently rises by 8% and General Motors’ stock price rises by 7%, what is the abnormal change in General Motors’ stock price?

20. The monthly rate of return on T-bills is 1%. The market went up this month by 1.5%. In addition, AmbChaser, Inc., which has an equity beta of 2, surprisingly just won a lawsuit that awards it $1 million immediately.
a. If the original value of AmbChaser equity were $100 million, what would you guess was the rate of return of its stock this month?
b. What is your answer to (a) if the market had expected AmbChaser to win $2 million?
21. In a recent closely contested lawsuit, Apex sued Bpex for patent infringement. The jury came back today with its decision. The rate of return on Apex was $r_A = 3.1\%$. The rate of return on Bpex was only $r_B = 2.5\%$. The market today responded to very encouraging news about the unemployment rate, and $r_M = 3\%$. The historical relationship between returns on these stocks and the market portfolio has been estimated from index model regressions as:

- Apex: $r_A = .2\% + 1.4r_M$
- Bpex: $r_B = -.1\% + .6r_M$

Based on these data, which company do you think won the lawsuit?

22. Investors *expect* the market rate of return in the coming year to be 12\%. The T-bill rate is 4\%. Changing Fortunes Industries’ stock has a beta of .5. The market value of its outstanding equity is $100$ million.

* a. What is your best guess currently as to the expected rate of return on Changing Fortunes’ stock? You believe that the stock is fairly priced.
* b. If the market return in the coming year actually turns out to be 10\%, what is your best guess as to the rate of return that will be earned on Changing Fortunes’ stock?
* c. Suppose now that Changing Fortunes wins a major lawsuit during the year. The settlement is $5$ million. Changing Fortunes’ stock return during the year turns out to be 10\%. What is your best guess as to the settlement the market previously *expected* Changing Fortunes to receive from the lawsuit? (Continue to assume that the market return in the year turned out to be 10\%.) The magnitude of the settlement is the only unexpected firm-specific event during the year.

23. Dollar-cost averaging means that you buy equal dollar amounts of a stock every period, for example, $500$ per month. The strategy is based on the idea that when the stock price is low, your fixed monthly purchase will buy more shares, and when the price is high, fewer shares. Averaging over time, you will end up buying more shares when the stock is cheaper and fewer when it is relatively expensive. Therefore, by design, you will exhibit good market timing. Evaluate this strategy.

24. Steady Growth Industries has never missed a dividend payment in its 94-year history. Does this make it more attractive to you as a possible purchase for your stock portfolio?

25. We know that the market should respond positively to good news, and that good-news events such as the coming end of a recession can be predicted with at least some accuracy. Why, then, can we not predict that the market will go up as the economy recovers?

26. If prices are as likely to increase as decrease, why do investors earn positive returns from the market on average?

27. You know that firm XYZ is very poorly run. On a scale of 1 (worst) to 10 (best), you would give it a score of 3. The market consensus evaluation is that the management score is only 2. Should you buy or sell the stock?

28. Examine the accompanying figure, which presents cumulative abnormal returns both before and after dates on which insiders buy or sell shares in their firms. How do you interpret this figure? What are we to make of the pattern of CARs before and after the event date?

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29. Suppose that during a certain week the Fed announces a new monetary growth policy, Congress surprisingly passes legislation restricting imports of foreign automobiles, and Ford comes out with a new car model that it believes will increase profits substantially. How might you go about measuring the market’s assessment of Ford’s new model?

30. Good News, Inc., just announced an increase in its annual earnings, yet its stock price fell. Is there a rational explanation for this phenomenon?

31. Your investment client asks for information concerning the benefits of active portfolio management. She is particularly interested in the question of whether or not active managers can be expected to consistently exploit inefficiencies in the capital markets to produce above-average returns without assuming higher risk.

The semistrong form of the efficient market hypothesis asserts that all publicly available information is rapidly and correctly reflected in securities prices. This implies that investors cannot expect to derive above-average profits from purchases made after information has become public because security prices already reflect the information’s full effects.

(a) Identify and explain two examples of empirical evidence that tend to support the EMH implication stated above.

(b) Identify and explain two examples of empirical evidence that tend to refute the EMH implication stated above.

(c) Discuss reasons why an investor might choose not to index even if the markets were, in fact, semistrong form efficient.

32. (a) Briefly explain the concept of the efficient market hypothesis (EMH) and each of its three forms—weak, semistrong, and strong—and briefly discuss the degree to which existing empirical evidence supports each of the three forms of the EMH.
PART III  Equilibrium in Capital Markets

b. Briefly discuss the implications of the efficient market hypothesis for investment policy as it applies to:
   i. Technical analysis in the form of charting.
   ii. Fundamental analysis.

CFA

33. Growth and value can be defined in several ways. “Growth” usually conveys the idea of a portfolio emphasizing or including only issues believed to possess above-average future rates of per-share earnings growth. Low current yield, high price-to-book ratios, and high price-to-earnings ratios are typical characteristics of such portfolios. “Value” usually conveys the idea of portfolios emphasizing or including only issues currently showing low price-to-book ratios, low price-to-earnings ratios, above-average levels of dividend yield, and market prices believed to be below the issues’ intrinsic values.

a. Identify and provide reasons why, over an extended period of time, value-stock investing might outperform growth-stock investing.

b. Explain why the outcome suggested in (a) should not be possible in a market widely regarded as being highly efficient.

SOLUTIONS TO CONCEPT CHECKS

1. a. A high-level manager might well have private information about the firm. Her ability to trade profitably on that information is not surprising. This ability does not violate weak-form efficiency: The abnormal profits are not derived from an analysis of past price and trading data. If they were, this would indicate that there is valuable information that can be gleaned from such analysis. But this ability does violate strong-form efficiency. Apparently, there is some private information that is not already reflected in stock prices.

b. The information sets that pertain to the weak, semistrong, and strong form of the EMH can be described by the following illustration:

The weak-form information set includes only the history of prices and volumes. The semistrong-form set includes the weak form set plus all publicly available information. In turn, the strong-form set includes the semistrong set plus insiders’ information. It is illegal to act on the incremental information (insiders’ private information). The direction of valid implication is

Strong-form EMH ⇒ Semistrong-form EMH ⇒ Weak-form EMH

The reverse direction implication is not valid. For example, stock prices may reflect all past price data (weak-form efficiency) but may not reflect relevant fundamental data (semistrong-form inefficiency).
### SOLUTIONS TO CONCEPT CHECKS

2. The point we made in the preceding discussion is that the very fact that we observe stock prices near so-called resistance levels belies the assumption that the price can be a resistance level. If a stock is observed to sell at any price, then investors must believe that a fair rate of return can be earned if the stock is purchased at that price. It is logically impossible for a stock to have a resistance level and offer a fair rate of return at prices just below the resistance level. If we accept that prices are appropriate, we must reject any presumption concerning resistance levels.

3. If everyone follows a passive strategy, sooner or later prices will fail to reflect new information. At this point there are profit opportunities for active investors who uncover mispriced securities. As they buy and sell these assets, prices again will be driven to fair levels.

4. Predictably declining CARs do violate the EMH. If one can predict such a phenomenon, a profit opportunity emerges: Sell (or short sell) the affected stocks on an event date just before their prices are predicted to fall.

5. The answer depends on your prior beliefs about market efficiency. Magellan’s record was incredibly strong. On the other hand, with so many funds in existence, it is less surprising that some fund would appear to be consistently superior after the fact. Still, Magellan’s record was so good that even accounting for its selection as the “winner” of an investment “contest,” it still appears to be too good to be attributed to chance.

### E-INVESTMENTS: EARNINGS SURPRISES

Several websites list information on earnings surprises. Much of the information supplied is from Zacks.com. Each day the largest positive and negative surprises are listed. Go to [http://my.zacks.com/earnings](http://my.zacks.com/earnings) and identify the top earnings surprises for the day. The table will list the time and date of the announcement.

Identify the tickers for the top three positive surprises. Once you have identified the top surprises, go to [http://finance.yahoo.com](http://finance.yahoo.com). Enter the ticker symbols and obtain quotes for these securities. Examine the 5-day charts for each of the companies. Is the information incorporated into price quickly? Is there any evidence of prior knowledge or anticipation of the disclosure in advance of the trading?