CHAPTER 12

MARKET EFFICIENCY
AND BEHAVIORAL
FINANCE
MARKET EFFICIENCY AND BEHAVIORAL FINANCE

- Random Walks and the Efficient Market Hypothesis (EMH)
- Implications of the EMH
- Event Studies
MARKET EFFICIENCY AND BEHAVIORAL FINANCE

- Are Markets Efficient?
- A Behavioral Interpretation
- Mutual Fund Performance
Suppose Kendall had discovered that stock prices are predictable. What a gold mine this would have been. 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 3 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.
RANDOM WALKS AND THE EFFICIENT MARKET HYPOTHESIS

- 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 likely to fail. 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 would be 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.
RANDOM WALKS AND THE EFFICIENT MARKET HYPOTHESIS

- Figure 12.1 illustrates the response of stock prices to new information in an efficient market.
- The graph plots the price response of a sample of 194 firms that were targets of takeover attempts.
Figure 12.1
Cumulative abnormal returns before takeover attempts: Target companies

RANDOM WALKS AND THE EFFICIENT MARKET HYPOTHESIS

- In most takeovers, the acquiring firm pays a substantial premium over current market prices. Therefore, announcement of a takeover attempt should cause the stock price to jump. The figure shows that stock prices jump dramatically on the day the news becomes public.
RANDOM WALKS AND THE EFFICIENT MARKET HYPOTHESIS

- However, there is no further drift in prices after the announcement date, suggesting that prices reflect the new information, including the likely magnitude of the takeover premium, by the end of the trading day.
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.
Competition as the Source of Efficiency

- When information is costly to uncover and analyze, one would expect investment analysis calling for such expenditures to result in an increased expected return.
Competition as the Source of Efficiency

- 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 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 makes sense to consider and respect your competition.
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 as the Source of Efficiency

- 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.”
Versions of the Efficient Market Hypothesis

- 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.
Versions of the Efficient Market Hypothesis

- 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 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.
Versions of the Efficient Market Hypothesis

- 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.
Versions of the Efficient Market Hypothesis

- 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.
Versions of the Efficient Market Hypothesis

- 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.
Versions of the Efficient Market Hypothesis

- 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.
Versions of the Efficient Market Hypothesis

- 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.
IMPLICATIONS OF THE EMH

- Technical Analysis
- Fundamental Analysis
- Active versus Passive Portfolio Management
- The Role of Portfolio Management in an Efficient Market
- Resource Allocation
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. The Dow theory, named after its creator Charles Dow (who established The Wall Street Journal), is the grandfather of most technical analysis.
Technical Analysis

- 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.
Technical Analysis

- 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.
Technical Analysis

- 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-lives market declines lasting a few weeks. The intraday minor trends have no long-run impact on price.
Figure 12.2
Dow theory trends

Technical Analysis

- 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 $B$).
Technical Analysis

- 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).
Technical Analysis

- One of more-recent variations on the Dow theory is the Elliott wave theory.
  - 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.
Another more-recent variations on the Dow theory is the theory of Kondratieff waves.

- 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.
Technical Analysis

- 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.
Technical Analysis

- 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.
Technical Analysis

- 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.
Technical Analysis

- 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 ration of the stock price to a market indicator such as the S&P500 index.
Technical Analysis

- 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.
EXAMPLE 12.2: Resistance Levels

- Consider 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.
EXAMPLE 12.2: Resistance Levels

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 Analysis

- 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.
Technical Analysis

- For example, the trin statistic ("trin" stands for trading index) equals

\[
\text{Trin} = \frac{\text{Volume declining/Number declining}}{\text{Volume advancing/Number advancing}}
\]

Therefore, trin is the ratio of average volume in declining issues to average volume in advancing issues.
Technical Analysis

- 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.
Technical Analysis

- 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.
Technical Analysis

- 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.
Technical Analysis

- 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.
Technical Analysis

- 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 in Example 12.2. 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.
Technical Analysis

- 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 purchase (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.
Suppose, for example, that the Dow theory predicts an upward primary trend. If the theory is widely accepted, it follows that many investors will attempt to buy stocks immediately 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.
Technical Analysis

- The Dow theory’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 attempts to exploit it.
Technical Analysis

- Thus the market dynamic is one of a continual search for profitable trading rules, followed 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.
Fundamental Analysis

- Ultimately, fundamental analysis represents an attempt to determine the present discounted value of all the payments 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 Analysis

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.
Fundamental Analysis

- 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 analyses that underlie fundamental analysis.
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 information, his or her evaluation of the firm’s prospects is not likely to be significantly more accurate than those of rival analysts.
Fundamental Analysis

- 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

- 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.
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

- 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.
Active versus Passive Portfolio Management

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 mispricing be sufficiently large to repay the costs entailed in active portfolio management?
Active versus Passive 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.
Active versus Passive Portfolio Management

- 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.
Active versus Passive Portfolio Management

- 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. The nearby box is a parable illustrating this point.
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.
Active versus Passive Portfolio Management

- The performance of 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.
Active versus Passive Portfolio Management

- 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.
Active versus Passive Portfolio Management

- 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 MSCI index of small-capitalization U.S. companies, the European equity market, and the Pacific Basin equity market.
Active versus Passive Portfolio Management

- 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.
The Role of Portfolio Management in an Efficient Market

- 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 gains income is more valuable the higher the current tax bracket.
The Role of Portfolio Management in an Efficient Market

- 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.
The Role of Portfolio Management in an Efficient Market

- 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.
The Role of Portfolio Management in an Efficient Market

- 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.
The Role of Portfolio Management in an Efficient Market

- 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 4). Because these investors are living off accumulated savings, they require conservation of principal.
The Role of Portfolio Management in an Efficient Market

- In contrast, younger investors might be more inclined toward long-term inflation-indexed bonds. The steady flow of real income over long periods of time that is locked in with these bonds can be more important than preservation of principal to those with long life expectancies.
The Role of Portfolio Management in an Efficient Market

- 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.
Resource Allocation

- We’ve focused so far on the investments implications of the efficient market hypothesis. Deviations from efficiency may offer profit opportunities to better-informed traders at the expense of less-informed traders.
Resource Allocation

• However, deviations from informational efficiency would also result in large cost that will be borne by all citizens, namely, inefficient resource allocation. Recall that in a capitalist economy, investments in real assets such as plant, equipment, and know-how are guided in large part by the prices of financial assets.
Resource Allocation

- For example, if the values of biotech assets as reflected in the stock market prices of biotech firms exceed the cost of acquiring those assets, the managers of such firms have a strong signal that further investments in the firm will be regarded by the market as a positive net present value venture.
Resource Allocation

- In this manner, capital market prices guide resource allocation. Security mispricing thus could entail severe social costs by fostering inappropriate investments on the real side of the economy.
Resource Allocation

- Corporations with overpriced securities will be able to obtain capital too cheaply and corporations with undervalued securities might forego investment opportunities because the cost of raising capital will be too high. Therefore, inefficient capital markets would diminish one of the most potent benefits of a market economy.
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.
EVENT STUDIES

- 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.
EVENT STUDIES

- 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.
EVENT STUDIES

- 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.
EVENT STUDIES

- 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.
EVENT STUDIES

- Recall that a single-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

$$r_t = a + br_{Mt} + e_t \quad (12.1)$$
In equation 12.1, $r_{Mt}$ 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.
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:

$$e_t = r_t - (a + b r_{Mt}) \quad (12.2)$$
EVENT STUDIES

- 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. 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.
EXAMPLE 12.3: Abnormal Returns

- Suppose that the analyst has estimated that $a = .05\%$ 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 $0.05\% + 0.8 \times 1\% = 0.85\%$. 
EXAMPLE 12.3: Abnormal Returns

- If the stock actually rises by 2%, the analyst would infer that firm-specific news that day caused an additional stock return of 2% – .85% = 1.15%. This is the abnormal return for the day.
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.
EVENT STUDIES

- 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.
EVENT STUDIES

- 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 indication 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 12.1 (earlier in the chapter) 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 12.1 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.
EVENT STUDIES

- 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.
EVENT STUDIES

- 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 12.1.
EVENT STUDIES

The pattern of returns for the days preceding the public announcement date yields some interesting evidence about efficient markets and information leakage.
EVENT STUDIES

- 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.
EVENT STUDIES

- Instead, we should observe a clean jump in the stock price only on the announcement day. In fact, Figure 12.1 shows that the prices of the takeover targets clearly start an upward drift 30 days before the public announcement.
EVENT STUDIES

- 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 possible, evidence of leakage appears almost universally in event studies, even in cases where the public’s access to information is not gradual.
EVENT STUDIES

- Actually, the SEC itself can take some comfort from patterns such as that in Figure 12.1. 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.
EVENT STUDIES

- 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.
EVENT STUDIES

- 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.

- The SEC regularly uses event studies to measure illicit gains captured by traders who may have violated insider trading or other securities laws.
- Event studies are also used in fraud cases, where the courts must assess damages caused by a fraudulent activity.
ARE MARKETS EFFICIENT?  
The Issues

- The efficient market hypothesis 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.
ARE MARKETS EFFICIENT?  
The Magnitude Issue

- We noted that an investment manager overseeing a $5 billion portfolio who can improve performance by only 0.1% per year will increase investment earnings by $0.1 \times 5 \text{ billion} = 500 \text{ million} \text{ annually. This manager clearly would be worth her salary! Yet can we, as observers, statistically measure her contribution?}
ARE MARKETS EFFICIENT? 
The Magnitude Issue

- Probably not: A 0.1% 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 around 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.
ARE MARKETS EFFICIENT?
The Magnitude Issue

- 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.
ARE MARKETS EFFICIENT?  
The Magnitude Issue

- Rather than ask the qualitative question, Are markets efficient? We ought instead to ask a more quantitative question: How efficient are markets?
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.
ARE MARKETS EFFICIENT?
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.
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.
Weak-Form Tests: Returns over Short Horizons

- Early tests of efficient markets 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.
Weak-Form Tests: Returns over Short Horizons

- 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.
Weak-Form Tests: Returns over Short Horizons

- 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).
Weak-Form Tests: Returns over Short Horizons

- 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.
Weak-Form Tests: Returns over Short Horizons

- Thus, while these studies demonstrate weak price trends over short periods, the evidence does not clearly suggest the existence of trading opportunities.
Weak-Form Tests: Returns over Short Horizons

- While broad market indexes demonstrate only weak serial correlation, there appears to be stronger momentum in performance across market sectors exhibiting the best and worst recent returns.
Weak-Form Tests: Returns over Short Horizons

- In an investigation of intermediate-horizon stock price behavior (using 3- to 12-month holding periods), Jegadeesh and Titman found a momentum effect in which good or bad recent performance of particular stocks continues over time.
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.
Weak-Form Tests: Returns over Short Horizons

- Thus, it appears that there is evidence of short- to intermediate-horizon price momentum in both the aggregate market and cross-sectionally (i.e., across particular stocks).
Tests of long-horizon returns (i.e., returns over multiyear periods) have found suggestions of pronounced negative long-term serial correlation in the performance of the aggregate market. This result has given rise to a “fads hypothesis,” which asserts that the stock market might overreact to relevant news.
Weak-Form Tests: Returns over Long Horizons

- Such overreaction leads to positive aerial 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 gives the stock market the appearance of fluctuating around its fair value.
Weak-Form Tests: Returns over Long Horizons

- 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.
Weak-Form Tests: Returns over Long Horizons

- An alternative interpretation of these results holds that they indicate only that the market risk premium varies over time. For example, when the risk premium and the required return on the market rises, stock prices will fall.
Weak-Form Tests: Returns over Long Horizons

- 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.
Weak-Form Tests: Returns over Long Horizons

Many other studies suggest that over long horizons, extreme performance in particular securities also 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.
Weak-Form Tests: Returns over Long Horizons

- DeBondt and Thaler and Chopra, Lakonishok, and Ritter 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.
Weak-Form Tests: Returns over Long Horizons

- 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.
Weak-Form Tests: Returns over Long Horizons

- 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.
Thus it appears that there may be short-run momentum but long-run reversal patterns in price behavior both for the market as a whole and across sectors of the market. 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).
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.
Predictors of Broad Market Returns

- 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.
Predictors of 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.
Predictors of Broad Market Returns

- 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. 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 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.
Investigations of the efficacy of fundamental analysis ask whether publicly available information beyond the trading history of a security can be used to improve investment performance, and therefore are tests of semistrong-form market efficiency.
Semistrong Tests: Market Anomalies

- Surprisingly, several easily accessible statistics, for example a stock’s price-earnings ratio or its market capitalization, seem to predict abnormal risk-adjusted returns. Findings such as these are difficult to reconcile with the efficient market hypothesis, and therefore are often referred to as efficient market anomalies.
A difficulty in interpreting these tests is that we usually need to adjust for portfolio risk before evaluating the success of an investment strategy. Many tests, for example, use the CAPM to adjust for risk.
Semistrong Tests: Market Anomalies

- However, we know that even if beta is 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.
Semistrong Tests: Market Anomalies

- 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.
Semistrong Tests: Market Anomalies

- 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.
Semistrong Tests: Market Anomalies

- 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 that portfolios of low price-earnings (P/E) 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 by using hard work and much insight, it hardly seems possible that such a simplistic technique is enough to generate abnormal returns.
Semistrong Tests: Market Anomalies

- 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.
The so-called size or small-firm effect, originally documented by Banz, is illustrated in Figure 12.5. 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).
Figure 12.5
Returns in excess of risk-free rate and in excess of the Security Market Line for 10 size-based portfolios, 1926–2000

Semistrong Tests: The Small-Firm-in-January Effect

- 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%.
Semistrong Tests: The Small-Firm-in-January Effect

- 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.
Semistrong Tests: The 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.
Semistrong Tests: The Small-Firm-in-January Effect

- 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.
Semistrong Tests: The Small-Firm-in-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.
Semistrong Tests: The Small-Firm-in-January Effect

- 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.
Semistrong Tests: The Small-Firm-in-January Effect

Still, this theory is unsatisfying. 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.
Semistrong Tests: The Small-Firm-in-January Effect

- Second, 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.
Semistrong Tests: 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.
Semistrong Tests: The Neglected-Firm Effect and Liquidity Effects

“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.
Semistrong Tests: The Neglected-Firm Effect and Liquidity Effects

- 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.
An article by Merton shows that neglected firms might be expected to earn higher equilibrium returns as compensation for the risk associated with limited information. In this sense the neglected firm premium is not strictly a market inefficiency, but is a type of risk premium.
Work by Amilhud 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.
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.
Semistrong Tests: 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.
Semistrong Tests: Book-to-Market Ratios

- 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 12.6 shows the pattern of returns across deciles.
Figure 12.6
Average rate of return as a function of the book-to-market ratio

Semistrong Tests: Book-to-Market Ratios

- 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.
Semistrong Tests: Book-to-Market Ratios

- 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.
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 firm’s earnings announcements.
Semistrong Tests: Post-Earnings-Announcement Price Drift

- The “new 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.”
Foster, Olsen, and Shevlin 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.
Semistrong Tests: Post-Earnings-Announcement Price Drift

- 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 12.7 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 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 rise—in other words, exhibit momentum—even after the earnings information becomes public, while the negative-surprise firms continue to suffer negative abnormal returns.
Semistrong Tests: Post-Earnings-Announcement Price Drift

- 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.
Strong-Form Tests: Inside Information

- It would not be surprising if insiders were able to make superior profits trading in their firm’s stock. In other words, we do not expect markets to be strong-from efficient; we regulate and limit trades based on inside information.
The ability of insiders to trade profitably in their own stock has been documented in studies by Jaffe, Seyhum, Givoly and Palmon, 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.
Strong-Form Tests: Inside Information

- 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.
Strong-Form Tests: Inside 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.
Strong-Form Tests: Inside Information

- 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.
Interpreting the Evidence

How should we interpret the ever-growing anomalies literature? Does it imply that markets are grossly inefficient, allowing for simplistic trading rules to offer large profit opportunities? Or are there other, more-subtle interpretations?
Risk Premiums or Inefficiencies?

- The price-earnings, small-firm, market-to-book, momentum, and long-term reversal effects are currently among the most puzzling phenomena in empirical finance.
Risk Premiums or Inefficiencies?

- There are several interpretations of these effects. First note that to some extent, some of these 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.
Risk Premiums or Inefficiencies?

- 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.
Risk Premiums or Inefficiencies?

- 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
- (3) a portfolio that reflects the relative returns of firms with high versus low ratios of book value to market value
Risk Premiums or Inefficiencies?

- 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.
Risk Premiums or Inefficiencies?

- 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.
Risk Premiums or Inefficiencies?

- 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.
Risk Premiums or Inefficiencies?

- 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.
Risk Premiums or Inefficiencies?

- 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.
Risk Premiums or Inefficiencies?

- 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.
Risk Premiums or Inefficiencies?

- Daniel and Titman attempt to test whether the size and book-to-market effects can in fact be explained as risk premia. They classify firms according to size and book-to-market ratio, and further stratify portfolios based on the betas of each stock on size and book-to-market factors.
Risk Premiums or Inefficiencies?

- 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.
Risk Premiums or Inefficiencies?

- 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.
Risk Premiums or Inefficiencies?

- 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 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.
Some researchers wonder whether these anomalies cited in the literature are really unexplained puzzles in financial markets, or whether they instead are and 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.
Anomalies or Data Mining?

- In this regard, it is noteworthy that some anomalies have not shown much staying power after being reported in the academic literature.
Anomalies or Data Mining?

Two examples are as follows:

- After the small-firm effect was published in the early 1980s, it promptly disappeared for much of the rest of the decade.
- Similarly, the book-to-market strategy, which commanded considerable attention in the early 1990s, was ineffective for the rest of that decade.
Anomalies or Data Mining?

- 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.
Anomalies or Data Mining?

- 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.
Anomalies or Data Mining?

- 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.
Anomalies or Data Mining?

- 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.
The premise of **behavioral finance** is that conventional financial theory ignores how real people make decisions and that people make a difference. A growing number of economists have come to interpret the anomalies literature as consistent with several “irrationalities” individuals exhibit when making complicated decisions.
These irrationalities stem from two main premises:

- First, investors do not always process information correctly and therefore infer incorrect probability distributions about future rates of return.
- Second, even given a probability distribution of returns, investors often make inconsistent or systematically suboptimal decisions.
A BEHAVIOAL INTERPRETION

- Of course, the existence of irrational investors would not by itself be sufficient to render capital markets inefficient. If such irrationalities did affect prices, then sharp-eyed arbitrageurs taking advantage of profit opportunities might be expected to push prices back to their proper values.
A BEHAVIOAL INTERPRETION

Thus, the second leg of the behavioral critique is that in practice the actions of such arbitrageurs are limited. This leg of the argument is important when we interpret tests of market efficiency.
Virtually everyone agrees that if prices are right (i.e., price = intrinsic value), then there are no easy profit opportunities. But the reverse is not necessarily true. If behaviorists are correct about limits to arbitrage activity, then the absence of profit opportunities does not necessarily imply that markets are efficient.
Most tests of the efficient market hypothesis have focused on the existence of profit opportunities, often as reflected in the performance of money managers. But their failure to perform well (see Chapter 4 and the next section) need not imply that markets are in fact efficient.
We will examine some of the information-processing and behavioral irrationalities documented by psychologists and show how these tendencies might be consistent with the anomalies discussed earlier in this chapter. We will then briefly consider limits to arbitrage, and finally evaluate the import of the behavioral debate.
Errors in information processing can lead investors to misestimate the true probabilities of possible events or associated rates or return. Several such biases have been catalogued. Here are four of the more important ones: forecasting errors, overconfidence, conservatism, and sample size neglect and representativeness.
Forecasting Errors

- A series of experiments by Kahneman and Tversky indicates that people give too much weight to recent experience compared to prior beliefs when making forecasts (sometimes dubbed a memory bias) and tend to make forecasts that are too extreme given the uncertainty inherent in their information.
DeBondt and Thaler 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, perhaps due to favorable recent performance, they tend to be too high relative to the objective prospects of the firm.
Forecasting Errors

- 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.
Overconfidence

- People tend to overestimate the precision of their beliefs or forecasts, and they tend to overestimate their abilities. 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 is consistent with a tendency to overestimate ability.
An interesting example of overconfidence in financial markets is provided by Barber and Odean, who compare trading activity and average returns in brokerage accounts of men and women. They find that men (in particular single men) trade far more actively than women, consistent with the greater overconfidence among men well-documented in the psychology literature.
Overconfidence

- They also find that high trading activity is highly predictive of poor investment performance. The top 20% of accounts ranked by portfolio turnover had average returns 7 percentage points lower than the 20% of the accounts with the lowest turnover rates. As they conclude, “Trading [and by implication, overconfidence] is hazardous to your wealth.”
Conservatism

- A conservatism bias means that investors are too slow (too conservative) in updating their beliefs in response to recent evidence. This means that they might initially underreact to news about a firm, so that prices will fully reflect new information only gradually. Such a bias would give rise to momentum in stock market returns.
Sample Size Neglect and Representativeness

- It seems that people commonly do not take into account the size of a sample, apparently reasoning that a small sample is just as representative of a population as a large one. They may therefore infer a pattern too quickly based on a small sample and extrapolate apparent trends too far into the future.
Sample Size Neglect and Representativeness

- It is easy to see how such a pattern would be consistent with overreaction and correction anomalies.
Sample Size Neglect and Representativeness

- A short-lived run of good earnings reports or high returns on a stock would lead such investors to revise their assessments of likely future performance, and thus generate buying pressure that exaggerates the price run-up. Eventually, the gap between price and intrinsic value become glaring and the market corrects its initial error.
Sample Size Neglect and Representativeness

- Interestingly, there is evidence that stocks with the best recent performance show reversals precisely in the few days surrounding earnings announcements, suggesting that the correction occurs just as investors learn that their initial beliefs were too extreme.
Combining the conservatism and representativeness biases, we can obtain a pattern of short-to-middle-term momentum, along with long-term reversals, broadly consistent with much of the literature.
Behavioral Biases

- Even if information processing were perfect, individuals might make less-than-fully rational decisions using that information. These behavioral biases largely affect how investors frame questions of risk versus return and therefore make risk-return trade-offs.
Framing

- Decisions seem to be affected by how choices are framed. For example, famous studies by Kahneman and Tversky find an individual may reject a bet when it is posed in terms of the risk surrounding possible gains but may accept that same bet when described in terms of the risk surrounding potential losses.
Framing

In other words, individuals may act risk-averse in terms of gains but risk-seeking in terms of losses. But in many cases, the choice of how to frame a risky venture—as involving gains or losses—can be arbitrary.
EXAMPLE 12.5: Framing

- Consider a coin toss with a payoff of $50 for tails. Now consider a gift of $50 that is bundled with a bet that imposes a loss of $50 if the coin comes up heads.
EXAMPLE 12.5: Framing

In both cases, you end up with zero for heads, and $50 for tails. But the former description frames the coin toss as posing a risky gain while the latter frames the coin toss in terms of risky losses. The difference in framing can lead to different attitudes toward the bet.
Mental Accounting

- Mental accounting is a specific 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 would not “dip into capital” by selling a few shares of another stock with the same total rate of return).
Statman argues that mental accounting is consistent with a tendency to ride losing stock positions for too long (since “behavioral investors” are reluctant to realize losses).
Mental Accounting

- Mental accounting effects also can help explain momentum in stock prices. The “house money effect” refers to gamblers’ greater willingness to accept new bets if they currently are ahead. They think of (i.e., frame) the bet as being made with their “winnings account,” that is, with the casino’s and not with their own money, and thus are more willing to accept risk.
Mental Accounting

- Analogously, after a stock market run-up, they view investments as largely funded out of a “capital gains account,” become more tolerant of risk, discount future cash flows at a lower rate, and thus further push up prices.
Psychologists have found that individuals who make decisions that turn out badly have more regret (blame themselves more) when that decision was more unconventional.
Regret avoidance

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.
Do Bondt and Thaler argue that such regret avoidance 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 of favor” and more likely to be in a financially precarious position.
Regret avoidance

- Similarly, smaller less-well-know firms are also less conventional investments. Such firms require more “courage” on the part of the investor, which increases the required rate of return.
Regret avoidance

- Mental accounting can add to this effect. If investors focus on the gains or losses of individual stocks, rather than on broad portfolios, then they can become more risk-averse concerning stocks with recent poor performance, discount their cash flows at a higher rate, and thereby create a “value stock risk premium.”
Limits to Arbitrage

- These behavioral biases would not matter for stock pricing if rational investors could fully profit from the mistakes of behavioral investors. As soon as prices went out of alignment, rational profit-seeking trading would re-establish proper pricing. However, behavioral advocates argue that in practice, several factors limit the ability to profit from mispricing.
Suppose that a share of IBM is undervalued. Buying it may present a profit opportunity, but it is hardly risk-free, since the presumed market undervaluation can get worse. While price eventually should converge to intrinsic value, this may not happen until after the investor’s investment horizon.
For example, the investor may be a mutual fund manager who may lose clients (not to mention a job) if short-term performance is poor or a trader who may run through her capital if the market turns against her even temporarily. Risk incurred in exploiting the apparent profit opportunity presumably will limit both the activity and effectiveness of these arbitrage traders.
Implementation Costs

- Exploiting overpricing can be particularly difficult. Short selling a security entails costs; short-sellers may have to return the borrowed security on little notice, rendering the horizon of the short sale uncertain; and some investors such as pension or mutual fund managers are simply not allowed to short securities. This can limit the ability of arbitrage activity to force prices to fair value.
Implementation Costs

For example, Pontiff demonstrates that deviations of price from net asset value in closed-end funds tend to be higher in funds that are more costly to arbitrage, for example those with high nonsystematic risk, making it difficult to hedge the risk incurred by taking a position in the fund.
Implementation Costs

- On the other hand, Ross illustrates that premiums and discounts on closed-end funds can be explained in a “rational framework.” Initial expectations of abnormal returns due to skilled management can drive price above net asset value. But management fees that reduce investors’ net returns can drive price below the net asset value of the portfolio.
Model Risk

- One always has to worry that an apparent profit opportunity is more apparent than real. Perhaps you are using a faulty model to value the security, and the price actually is right. This possibility, again, makes the trading activity risky and limits the extent to which it will be pursued.
Evaluating the Behavioral Critique

- The efficient market hypothesis implies that prices usually “are right” and therefore there are no easy profit opportunities.
Evaluating the Behavioral Critique

- Behaviorists emphasize that these two implications (correct prices and no profit opportunities) can be severed: prices can be wrong, but still not give rise to easy profit opportunities. Thus, evidence that profit opportunities are scarce does not necessarily imply that prices are right.
Evaluating the Behavioral Critique

- As investors, we are concerned with the existence of profit opportunities. The behavioral explanations of efficient market anomalies do not give guidance as to how to exploit any irrationality. For investors, the question is still whether there is money to be made from mispricing, and the behavioral literature is largely silent on this point.
Evaluating the Behavioral Critique

- However, as we pointed out earlier, one of the important implications of the efficient market hypothesis is that security prices serve as reliable guides to the allocation of real capital.
Evaluating the Behavioral Critique

- If prices are distorted, then capital markets will give misleading signals as to where the resources are best allocated. In this important sense, the behavioral critique of the efficient market hypothesis is potentially important.
Evaluating the Behavioral Critique

- There is considerable debate among financial economists concerning the strength of the behavioral critique. Many believe that the behavioral approach is too unstructured, in effect allowing virtually any anomaly to be explained by some combination of irrationalities chosen from a laundry list of behavioral biases.
Evaluating the Behavioral Critique

- More fundamentally, others are not convinced that the anomalies literature as a whole is a convincing indictment of the efficient market hypothesis. Fama reviews the anomalies literature and mounts a counterchallenge to the behavioral school.
Evaluating the Behavioral Critique

- Fama argues that the anomalies are inconsistent in terms of their support for one type of irrationality versus another.
  - For example, many papers document long-term corrections (consistent with overreaction) while many others document long-term continuations of abnormal returns (consistent with underreaction).
Evaluating the Behavioral Critique

Moreover, the statistical significance of many of these results is less than meets the eye. Even small errors in choosing a benchmark against which to compare returns can cumulate to large apparent abnormalities when applied to long-term returns.
Therefore, many of the results in these studies are sensitive to small benchmarking errors, and Fama finds that seemingly minor changes in methodology can have big impacts on conclusions. We will return to some of these issues in the next chapter.
Evaluating the Behavioral Critique

- Behavioral finance is still in its infancy. Its critique of full rationality in investor decision-making is well-taken, but the extent to which limited rationality affects asset pricing is controversial. It is probably still too early to pass judgment on the behavioral approach, specifically, which behavioral models will “stick” and become part of the standard toolkit of financial analysis.
MUTUAL FUND PERFORMANCE

- For investors, 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.

Figure 4.3 in that chapter demonstrated that between 1972 and 2001 the returns of a passive portfolio indexed to the Wilshire 5000 typically would have been better than those of the average equity fund.
Figure 4.3
Percent of equity mutual funds outperformed by Wilshire 5000 Index, 1972–2001

Source: The Vanguard Group.
MUTUAL FUND PERFORMANCE

- On the other hand, there was some (admittedly inconsistent) evidence 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.
MUTUAL FUND PERFORMANCE

- 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.
MUTUAL FUND PERFORMANCE

- 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.
MUTUAL FUND PERFORMANCE

- Malkiel computed these abnormal returns for a large sample of mutual funds between 1972 and 1991.
  - The results, which appear in Figure 12.8, show that the distribution of alphas is roughly bell shaped, with a mean that is slightly negative but statistically indistinguishable from zero. On average, it does not appear that these funds outperform the market index (the S&P 500) on a risk-adjusted basis.
Figure 12.8 Estimates of individual mutual fund alphas, 1972–1991

Note: The frequency distribution of estimated alphas for all equity mutual funds with 10-year continuous records.

One problem in interpreting these alphas is that the S&P 500 may not be an adequate benchmark against which to evaluate mutual fund returns.
Because mutual funds tend to maintain considerable holdings in equity of small firms, whereas the S&P 500 is exclusively comprised of large firms, mutual funds as a whole will tend to outperform the S&P when small firms outperform large ones and underperform when small firms fare worse.
Thus a better benchmark for the performance of funds would be an index that incorporates the stock market performance of smaller firms.
The importance of the benchmark can be illustrated by examining the returns on small stocks in various subperiods.

- In the 20-year period between 1945 and 1964, a small-stock index underperformed the S&P 500 by about 4% per year (i.e., the alpha of the small-stock index after adjusting for systematic risk was -4%). In the following 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.
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 and calculated fund alphas by using regressions that include as explanatory variables the excess returns of three benchmark portfolios rather than 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.
<table>
<thead>
<tr>
<th>Type of Fund (Wiesenberger Classification)</th>
<th>Number of Funds</th>
<th>Alpha (%)</th>
<th>t-Statistic for Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equity funds</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum capital gain</td>
<td>12</td>
<td>-4.59</td>
<td>-1.87</td>
</tr>
<tr>
<td>Growth</td>
<td>33</td>
<td>-1.55</td>
<td>-1.23</td>
</tr>
<tr>
<td>Growth and income</td>
<td>40</td>
<td>-0.68</td>
<td>-1.65</td>
</tr>
<tr>
<td>Balanced funds</td>
<td>31</td>
<td>-1.27</td>
<td>-2.73</td>
</tr>
</tbody>
</table>

Note: The three-index model calculates the alpha of each fund as the intercept of the following regression:

\[ r - r_f = \alpha + \beta_M (r_M - r_f) + \beta_S (r_S - r_f) + \beta_D (r_D - r_f) + \epsilon \]

where \( r \) is the return on the fund, \( r_f \) is the risk-free rate, \( r_M \) is the return on the S&P 500 index, \( r_S \) is the return on a non-S&P small-stock index, \( r_D \) is the return on a bond index, \( \epsilon \) is the fund’s residual return, and the betas measure the sensitivity of fund returns to the various indexes.

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.
Carhart 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 to Elton, Gruber, Das, and Hlavka.
MUTUAL FUND PERFORMANCE

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 the major anomalies discussed earlier: the small-firm effect, the book-to-market effect, and the intermediate-term momentum effect.
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 Zeckhauser 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 12.9 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.
Figure 12.9
Persistence of mutual fund performance. Performance over time of mutual fund groups ranked by initial year performance.

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.
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.”
So, Are Markets Efficient?

- 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.
So, Are Markets Efficient?

- 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.
So, Are Markets Efficient?

- 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.
So, Are Markets Efficient?

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