STOCKS AND THEIR VALUATION

Searching for the Right Stock

A recent study by the securities industry found that roughly half of all U.S. households have invested in common stocks. As noted in Chapter 8, the long-run performance of the U.S. stock market has been quite good. Indeed, during the past 75 years the market's average annual return has exceeded 12 percent. However, there is no guarantee that stocks will perform in the future as well as they have in the past. The stock market doesn't always go up, and investors can make or lose a lot of money in a short period of time. For example, in 2004, Apple Computer's stock more than tripled following sizzling sales of its iPod products. On the other hand, Merck's stock fell more than 30 percent in 2004, when it was forced to withdraw one of its best-selling drugs, Vioxx.

The broader market as represented by the Dow Jones Industrial Average declined 2.6 percent during the first quarter of 2005. The triggers here were concerns about rising interest rates, higher oil prices, and declining consumer confidence. During this quarter, several well-respected companies experienced much larger declines—for example, Microsoft fell 9.5 percent, Home Depot 10.5 percent, and General Motors 26.6 percent. This shows, first, that diversification is important, and second, that when it comes to picking stocks, it is not enough to simply pick a good company—the stock must also be "fairly" priced.

To determine if a stock is fairly priced, you first need to estimate the stock's true or "intrinsic value," a concept first discussed in Chapter 1. With this objective in mind, this chapter describes some models that analysts have used to estimate a stock's intrinsic value. As you will see, it is difficult to predict future stock prices, but we are not completely in the dark. After studying this chapter, you should have a reasonably good understanding of the factors that influence stock prices, and with that knowledge—plus a little luck—you should be able to successfully navigate the stock market's often treacherous ups and downs.

Source: Justin Lahart, "Last Year's Winners Had Little in Common," _The Wall Street Journal,_ January 3, 2005, p. R8.

Putting Things In Perspective

In Chapter 7 we examined bonds. We now turn to common and preferred stocks, beginning with some important background material that helps establish a framework for valuing these securities.

While it is generally easy to predict the cash flows received from bonds, forecasting the cash flows on common stocks is much more difficult. However, two fairly straightforward models can be used to help estimate the "true," or intrinsic, value of a common stock: (1) the dividend growth model and (2) the total corporate value model. A stock should be bought if its estimated intrinsic value exceeds its market price but sold if the price exceeds its intrinsic value. The same valuation concepts and models are also used in Chapter 10, where we estimate the cost of capital, a critical element in corporate investment decisions.

9.1 LEGAL RIGHTS AND PRIVILEGES OF COMMON STOCKHOLDERS

Its common stockholders are the *owners* of a corporation, and as such they have certain rights and privileges, as discussed in this section.

Control of the Firm

A firm's common stockholders have the right to elect its directors, who, in turn, elect the officers who manage the business. In a small firm, the major stockholder typically is also the president and chair of the board of directors. In large, publicly owned firms, the managers typically have some stock, but their personal holdings are generally insufficient to give them voting control. Thus, the managements of most publicly owned firms can be removed by the stockholders if the management team is not effective.

State and federal laws stipulate how stockholder control is to be exercised. First, corporations must hold elections of directors periodically, usually once a year, with the vote taken at the annual meeting. Frequently, one-third of the directors are elected each year for a three-year term. Each share of stock has one vote; thus, the owner of 1,000 shares has 1,000 votes for each director.[1] Stockholders can appear at the annual meeting and vote in person, but typically they transfer their right to vote to another person by means of a **proxy.** Management always solicits stockholders' proxies and usually gets them. However, if earnings are poor and stockholders are dissatisfied, an outside group may solicit the

Proxy
A document giving one person the authority to act for another, typically the power to vote shares of common stock.

---

[1] In the situation described, a 1,000-share stockholder could cast 1,000 votes for each of three directors if there were three contested seats on the board. An alternative procedure that may be prescribed in the corporate charter calls for cumulative voting. There the 1,000-share stockholder would get 3,000 votes if there were three vacancies, and he or she could cast all of them for one director. Cumulative voting helps small groups obtain representation on the board.

proxies in an effort to overthrow management and take control of the business. This is known as a **proxy fight.**

The question of control has become a central issue in finance in recent years. The frequency of proxy fights has increased, as have attempts by one corporation to take over another by purchasing a majority of the outstanding stock. These actions are called **takeovers.** Some well-known examples of takeover battles include KKR's acquisition of RJR Nabisco, Chevron's acquisition of Gulf Oil, and the QVC/Viacom fight to take over Paramount.

Managers without majority control (more than 50 percent of their firms' stock) are very much concerned about proxy fights and takeovers, and many of them have attempted to obtain stockholder approval for changes in their corporate charters that would make takeovers more difficult. For example, a number of companies have gotten their stockholders to agree (1) to elect only one-third of the directors each year (rather than electing all directors each year), (2) to require 75 percent of the stockholders (rather than 50 percent) to approve a merger, and (3) to vote in a "poison pill" provision that would allow the stockholders of a firm that is taken over by another firm to buy shares in the second firm at a reduced price. The poison pill makes the acquisition unattractive and, thus, wards off hostile takeover attempts. Managements seeking such changes generally cite a fear that the firm will be picked up at a bargain price, but it often appears that management's concern about its own position is an even more important consideration.

Management moves to make takeovers more difficult have been countered by stockholders, especially large institutional stockholders, who do not like barriers erected to protect incompetent managers. To illustrate, the California Public Employees Retirement System (Calpers), which is one of the largest institutional investors, has led proxy fights with several corporations whose financial performances were poor in Calpers' judgment. Calpers wants companies to give outside (nonmanagement) directors more clout and to force managers to be more responsive to stockholder complaints.

Prior to 1993, SEC rules prohibited large investors such as Calpers from getting together to force corporate managers to institute policy changes. However, the SEC changed its rules in 1993, and now large investors can work together to force management changes. This ruling has helped keep managers focused on stockholder concerns, which means the maximization of stock prices.

The Preemptive Right

Common stockholders often have the right, called the **preemptive right,** to purchase any additional shares sold by the firm. In some states, the preemptive right is automatically included in every corporate charter; in others, it must be specifically inserted into the charter.

The purpose of the preemptive right is twofold. First, it prevents the management of a corporation from issuing a large number of additional shares and purchasing these shares itself. Management could thereby seize control of the corporation and frustrate the will of the current stockholders. The second, and far more important, reason for the preemptive right is to protect stockholders against a dilution of value. For example, suppose 1,000 shares of common stock, each with a price of $100, were outstanding, making the total market value of the firm $100,000. If an additional 1,000 shares were sold at $50 a share, or for $50,000, this would raise the total market value to $150,000. When the new total market value is divided by new total shares outstanding, a value of $75 a share is obtained. The old stockholders would thus lose $25 per share, and the new stockholders would have an instant profit of $25 per share. Thus, selling common stock at a price below the market value would dilute its price and transfer

Proxy Fight
An attempt by a person or group to gain control of a firm by getting its stockholders to grant that person or group the authority to vote their shares to replace the current management.

Takeover
An action whereby a person or group succeeds in ousting a firm's management and taking control of the company.

Preemptive Right
A provision in the corporate charter or bylaws that gives common stockholders the right to purchase on a pro rata basis new issues of common stock (or convertible securities).

wealth from the present stockholders to those who were allowed to purchase the new shares. The preemptive right prevents this.

> Identify some actions that companies have taken to make takeovers more difficult.
>
> What is the preemptive right, and what are the two primary reasons for its existence?

9.2 TYPES OF COMMON STOCK

Classified Stock
Common stock that is given a special designation, such as Class A, Class B, and so forth, to meet special needs of the company.

Founders' Shares
Stock owned by the firm's founders that has sole voting rights but restricted dividends for a specified number of years.

Although most firms have only one type of common stock, in some instances **classified stock** is used to meet special needs. Generally, when special classifications are used, one type is designated *Class A*, another *Class B*, and so on. Small, new companies seeking funds from outside sources frequently use different types of common stock. For example, when Genetic Concepts went public recently, its Class A stock was sold to the public and paid a dividend, but this stock had no voting rights for five years. Its Class B stock, which was retained by the organizers of the company, had full voting rights for five years, but the legal terms stated that dividends could not be paid on the Class B stock until the company had established its earning power by building up retained earnings to a designated level. The use of classified stock thus enabled the public to take a position in a conservatively financed growth company without sacrificing income, while the founders retained absolute control during the crucial early stages of the firm's development. At the same time, outside investors were protected against excessive withdrawals of funds by the original owners. As is often the case in such situations, the Class B stock was also called **founders' shares.**

Note that "Class A," "Class B," and so on, have no standard meanings. Most firms have no classified shares, but a firm that does could designate its Class B shares as founders' shares and its Class A shares as those sold to the public, while another could reverse these designations. Still other firms could use stock classifications for entirely different purposes. For example, when General Motors acquired Hughes Aircraft for $5 billion, it paid in part with a new Class H common, GMH, which had limited voting rights and whose dividends were tied to Hughes's performance as a GM subsidiary. The reasons for the new stock were that (1) GM wanted to limit voting privileges on the new classified stock because of management's concern about a possible takeover and (2) Hughes employees wanted to be rewarded more directly on Hughes's own performance than would have been possible through regular GM stock. These Class H shares disappeared in 2003 when GM decided to sell off the Hughes unit.

> What are some reasons why a company might use classified stock?

9.3 COMMON STOCK VALUATION

Common stock represents an ownership interest in a corporation, but to the typical investor, a share of common stock is simply a piece of paper characterized by two features:

1. It entitles its owner to dividends, but only if the company has earnings out of which dividends can be paid and management chooses to pay dividends rather than retaining and reinvesting all the earnings. Whereas a bond con-

tains a *promise* to pay interest, common stock provides no such promise—if you own a stock, you may *expect* a dividend, but your expectations may not in fact be met. To illustrate, Long Island Lighting Company (LILCO) had paid dividends on its common stock for more than 50 years, and people expected those dividends to continue. However, when the company encountered severe problems a few years ago, it stopped paying dividends. Note, though, that LILCO continued to pay interest on its bonds, because if it had not, then it would have been declared bankrupt and the bondholders could have taken over the company.

2. Stock can be sold, hopefully at a price greater than the purchase price. If the stock is actually sold at a price above its purchase price, the investor will receive a *capital gain*. Generally, when people buy common stock they expect to receive capital gains; otherwise, they would not buy the stock. However, after the fact, they can end up with capital losses rather than capital gains. LILCO's stock price dropped from $17.50 to $3.75 in one year, so the *expected* capital gain on that stock turned out to be a huge *actual* capital loss.

Definitions of Terms Used in Stock Valuation Models

Common stocks provide an expected future cash flow stream, and a stock's value is found as the present value of the expected future cash flows, which consist of two elements: (1) the dividends expected in each year and (2) the price investors expect to receive when they sell the stock. The final price includes the return of the original investment plus an expected capital gain.

We saw in Chapter 1 that managers should seek to maximize the value of their firms' stock. Therefore, managers need to know how alternative actions are likely to affect stock prices, and we develop some models to help show how the value of a share of stock is determined. We begin by defining the following terms:

D_t = dividend the stockholder *expects* to receive at the end of each Year t. D_0 is the most recent dividend, which has already been paid; D_1 is the first dividend expected, and it will be paid at the end of this year; D_2 is the dividend expected at the end of two years; and so forth. D_1 represents the first cash flow a new purchaser of the stock will receive. Note that D_0, the dividend that has just been paid, is known with certainty. However, all future dividends are *expected values*, those expectations differ somewhat from investor to investor, and those differences lead to differences in estimates of the stock's intrinsic value.[2]

P_0 = actual **market price** of the stock today.

$\hat{P}_t$ = expected price of the stock at the end of each Year t (pronounced "P hat t"). $\hat{P}_t$ is the **intrinsic value** of the stock today as seen by the particular investor doing the analysis; $\hat{P}_1$ is the price expected at the end of one year; and so on. Note that $\hat{P}_0$ is the intrinsic value of the stock today based on a particular investor's estimate of the stock's expected dividend stream and the riskiness of that stream. Hence, whereas the market price P_0 is fixed and

Market Price, P_0
The price at which a stock sells in the market.

Intrinsic Value, $\hat{P}_0$
The value of an asset that, in the mind of a particular investor, is justified by the facts; $\hat{P}_0$ may be different from the asset's current market price.

---

[2] Stocks generally pay dividends quarterly, so theoretically we should evaluate them on a quarterly basis. However, in stock valuation, most analysts work on an annual basis because the data generally are not precise enough to warrant refinement to a quarterly model. For additional information on the quarterly model, see Charles M. Linke and J. Kenton Zumwalt, "Estimation Biases in Discounted Cash Flow Analysis of Equity Capital Cost in Rate Regulation," *Financial Management*, Autumn 1984, pp. 15–21.

is identical for all investors, $\hat{P}_0$ could differ among investors, depending on how optimistic they are regarding the company. $\hat{P}_0$, the individual investor's estimate of the intrinsic value today, could be above or below P_0, the current stock price. An investor would buy the stock only if their estimate of $\hat{P}_0$ were equal to or greater than P_0.

As there are many investors in the market, there can be many values for $\hat{P}_0$. However, we can think of an "average," or "marginal," investor whose actions actually determine the market price. For the marginal investor, P_0 must equal $\hat{P}_0$; otherwise, a disequilibrium would exist, and buying and selling in the market would change P_0 until $P_0 = \hat{P}_0$ for the marginal investor.

g = expected **growth rate** in dividends as predicted by the marginal investor. If dividends are expected to grow at a constant rate, g is also equal to the expected rate of growth in earnings and in the stock's price. Different investors use different g's to evaluate a firm's stock, but the market price, P_0, is set on the basis of g as estimated by the marginal investor.

r_s = minimum acceptable, or **required, rate of return** on the stock, considering both its riskiness and the returns available on other investments. Again, this term generally relates to the marginal investor. The determinants of r_s include the real rate of return, expected inflation, and risk as discussed in Chapter 8.

$\hat{r}_s$ = **expected rate of return** that an investor who buys the stock expects to receive in the future. $\hat{r}_s$ (pronounced "r hat s") could be above or below r_s, but one would buy the stock only if $\hat{r}_s$ were equal to or greater than r_s.

$\bar{r}_s$ = **actual,** or **realized,** *after-the-fact* **rate of return,** pronounced "r bar s." You may *expect* to obtain a return of $\bar{r}_s = 10\%$ if you buy a stock today, but if the market goes down, you may end up next year with an actual realized return that is much lower, perhaps even negative.

D_1/P_0 = expected **dividend yield** on the stock during the coming year. If the stock is expected to pay a dividend of $D_1 = \$1$ during the next 12 months, and if its current price is $P_0 = \$20$, then the expected dividend yield is $\$1/\$20 = 0.05 = 5\%$.

$\dfrac{\hat{P}_1 - P_0}{P_0}$ = expected **capital gains yield** on the stock during the coming year. If the stock sells for $20 today, and if it is expected to rise to $21.00 at the end of one year, then the expected capital gain is $\hat{P}_1 - P_0 = \$21.00 - \$20.00 = \$1.00$, and the expected capital gains yield is $\$1.00/\$20 = 0.05 = 5\%$.

Expected total return = $\hat{r}_s$ = expected dividend yield (D_1/P_0) plus expected capital gains yield [$(\hat{P}_1 - P_0)/P_0$]. In our example, the **expected total return = $\hat{r}_s = 5\% + 5\% = 10\%$.**

Growth Rate, g
The expected rate of growth in dividends per share.

Required Rate of Return, r_s
The minimum rate of return on a common stock that a stockholder considers acceptable.

Expected Rate of Return, $\hat{r}_s$
The rate of return on a common stock that a stockholder expects to receive in the future.

Actual Realized Rate of Return, $\bar{r}_s$
The rate of return on a common stock actually received by stockholders in some past period. $\bar{r}_s$ may be greater or less than $\hat{r}_s$ and/or r_s.

Dividend Yield
The expected dividend divided by the current price of a share of stock.

Capital Gains Yield
The capital gain during a given year divided by the beginning price.

Expected Total Return
The sum of the expected dividend yield and the expected capital gains yield.

Expected Dividends as the Basis for Stock Values

In our discussion of bonds, we found the value of a bond as the present value of interest payments over the life of the bond plus the present value of the bond's maturity (or par) value:

$$V_B = \frac{INT}{(1 + r_d)^1} + \frac{INT}{(1 + r_d)^2} + \cdots + \frac{INT}{(1 + r_d)^N} + \frac{M}{(1 + r_d)^N}$$

Stock prices are likewise determined as the present value of a stream of cash flows, and the basic stock valuation equation is similar to the bond valuation equation. What are the cash flows that corporations provide to their stockholders? First, think of yourself as an investor who buys a stock with the intention of holding it (in your family) forever. In this case, all that you (and your heirs) would receive is a stream of dividends, and the value of the stock today is calculated as the present value of an infinite stream of dividends:

$$\text{Value of stock} = \hat{P}_0 = \text{PV of expected future dividends}$$

$$= \frac{D_1}{(1 + r_s)^1} + \frac{D_2}{(1 + r_s)^2} + \cdots + \frac{D_\infty}{(1 + r_s)^\infty}$$

$$= \sum_{t=1}^{\infty} \frac{D_t}{(1 + r_s)^t} \qquad\qquad \textbf{(9-1)}$$

What about the more typical case, where you expect to hold the stock for a finite period and then sell it—what will be the value of $\hat{P}_0$ in this case? Unless the company is likely to be liquidated or sold and thus to disappear, *the value of the stock is again determined by Equation 9-1.* To see this, recognize that for any individual investor, the expected cash flows consist of expected dividends plus the expected sale price of the stock. However, the sale price the current investor receives will depend on the dividends some future investor expects. Therefore, for all present and future investors in total, expected cash flows must be based on expected future dividends. Put another way, unless a firm is liquidated or sold to another concern, the cash flows it provides to its stockholders will consist only of a stream of dividends; therefore, the value of a share of its stock must be established as the present value of that expected dividend stream.

The general validity of Equation 9-1 can also be confirmed by asking the following question: Suppose I buy a stock and expect to hold it for one year. I will receive dividends during the year plus the value $\hat{P}_1$ when I sell out at the end of the year. But what will determine the value of $\hat{P}_1$? The answer is that it will be determined as the present value of the dividends expected during Year 2 plus the stock price at the end of that year, which, in turn, will be determined as the present value of another set of future dividends and an even more distant stock price. This process can be continued ad infinitum, and the ultimate result is Equation 9-1.[3]

SELF TEST ?

Explain the following statement: "Whereas a bond contains a promise to pay interest, a share of common stock typically provides an expectation of, but no promise of, dividends plus capital gains."

What are the two parts of most stocks' expected total return?

If $D_1 = \$2.00$, $g = 6\%$, and $P_0 = \$40$, what are the stock's expected dividend yield, capital gains yield, and total expected return for the coming year? (5%, 6%, 11%)

---

[3] We should note that investors periodically lose sight of the long-run nature of stocks as investments and forget that in order to sell a stock at a profit, one must find a buyer who will pay the higher price. If you analyze a stock's value in accordance with Equation 9-1, conclude that the stock's market price exceeds a reasonable value, and then buy the stock anyway, then you would be following the "bigger fool" theory of investment—you think you may be a fool to buy the stock at its excessive price, but you also think that when you get ready to sell it, you can find someone who is an even bigger fool. The bigger fool theory was widely followed in the summer of 1987, just before the stock market lost more than one-third of its value in the October 1987 crash.

9.4 CONSTANT GROWTH STOCKS

Equation 9-1 is a generalized stock valuation model in the sense that the time pattern of D_t can be anything: D_t can be rising, falling, fluctuating randomly, or it can even be zero for several years and Equation 9-1 will still hold. With a computer spreadsheet we can easily use this equation to find a stock's intrinsic value for any pattern of dividends. In practice, the hard part is obtaining an accurate forecast of the future dividends.

In many cases, the stream of dividends is expected to grow at a constant rate. If this is the case, Equation 9-1 may be rewritten as follows:

$$\hat{P}_0 = \frac{D_0 (1 + g)^1}{(1 + r_s)^1} + \frac{D_0 (1 + g)^2}{(1 + r_s)^2} + \cdots + \frac{D_0(1 + g)^\infty}{(1 + r_s)^\infty}$$

$$= \frac{D_0 (1 + g)}{r_s - g} = \frac{D_1}{r_s - g} \tag{9-2}$$

Constant Growth (Gordon) Model
Used to find the value of a constant growth stock.

The last term of Equation 9-2 is called the **constant growth model,** or the **Gordon model,** after Myron J. Gordon, who did much to develop and popularize it.[4]

Illustration of a Constant Growth Stock

Assume that Allied Food Products just paid a dividend of $1.15 (that is, $D_0 = \$1.15$). Its stock has a required rate of return, r_s, of 13.4 percent, and investors expect the dividend to grow at a constant 8 percent rate in the future. The estimated dividend one year hence would be $D_1 = \$1.15(1.08) = \$1.24$; D_2 would be $1.34; and the estimated dividend five years hence would be $1.69:

$$D_5 = D_0(1 + g)^5 = \$1.15(1.08)^5 = \$1.69$$

We could use this procedure to estimate all future dividends, then use Equation 9-1 to determine the current stock value, $\hat{P}_0$. In other words, we could find each expected future dividend, calculate its present value, and then sum all the present values to find the intrinsic value of the stock.

Such a process would be time consuming, but we can take a short cut—just insert the illustrative data into Equation 9-2 to find the stock's intrinsic value, $23:

$$\hat{P}_0 = \frac{\$1.15(1.08)}{0.134 - 0.08} = \frac{\$1.242}{0.054} = \$23.00$$

Note that a necessary condition for the derivation of Equation 9-2 is that the required rate of return, r_s, be greater than the long-run growth rate, g. *If the equation is used in situations where r_s is not greater than g, the results will be wrong, meaningless, and possibly misleading.*

The concept underlying the valuation process for a constant growth stock is graphed in Figure 9-1. Dividends are growing at the rate g = 8 percent, but because r_s > g, the present value of each future dividend is declining. For example, the dividend in Year 1 is $D_1 = D_0(1 + g)^1 = \$1.15(1.08) = \$1.242$. However, the present value of this dividend, discounted at 13.4 percent, is $PV(D_1) = \$1.242/(1.134)^1 = \$1.095$. The dividend expected in Year 2 grows to $1.242 (1.08) = \$1.341$, but the present value of this dividend falls to $1.043. Continuing,

---

[4] The last term in Equation 9-2 is derived in the Web/CD Extension of Chapter 5 of Eugene F. Brigham and Phillip R. Daves, *Intermediate Financial Management*, 8th ed. (Mason, OH: Thomson/South-Western, 2004). In essence, Equation 9-2 is the sum of a geometric progression, and the final result is the solution value of the progression.

FIGURE 9-1   *Present Values of Dividends of a Constant Growth Stock where $D_0 = \$1.15$, $g = 8\%$, $r_s = 13.4\%$*
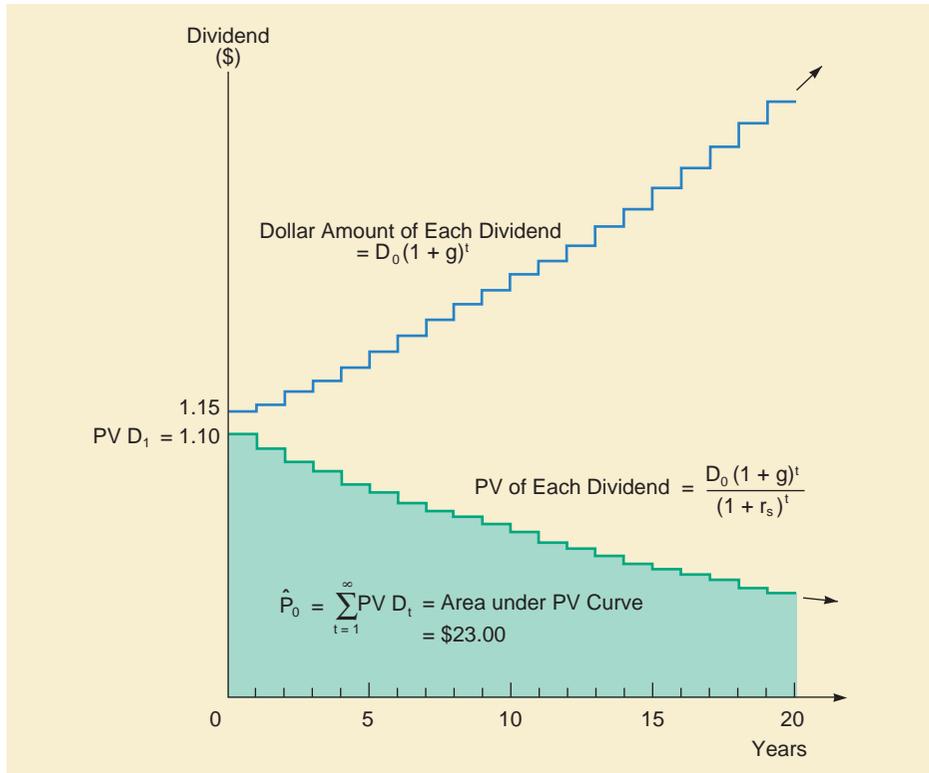
$D_3 = \$1.449$ and $PV(D_3) = \$0.993$, and so on. Thus, the expected dividends are growing, but the present value of each successive dividend is declining, because the dividend growth rate (8 percent) is less than the rate used for discounting the dividends to the present (13.4 percent).

If we summed the present values of each future dividend, this summation would be the value of the stock, $\hat{P}_0$. When g is a constant, this summation is equal to $D_1/(r_s - g)$, as shown in Equation 9-2. Therefore, if we extended the lower step-function curve in Figure 9-1 on out to infinity and added up the present values of each future dividend, the summation would be identical to the value given by Equation 9-2, $23.00.

Note that if the growth rate exceeded the required return, the PV of each future dividend would exceed that of the prior year. If this situation were graphed in Figure 9-1, both step-function curves would be increasing, suggesting an infinitely high stock price. Moreover, the stock price as calculated using Equation 9-2 would be *negative*. Obviously, stock prices can be neither infinite nor negative, and this illustrates why Equation 9-2 cannot be used unless $r_s > g$. We will return to this point later in the chapter.

Dividend and Earnings Growth

Growth in dividends occurs primarily as a result of growth in *earnings per share (EPS)*. Earnings growth, in turn, results from a number of factors, including (1) the amount of earnings the company retains and reinvests, (2) the rate of

return the company earns on its equity (ROE), and (3) inflation. Regarding inflation, if output (in units) is stable but both sales prices and input costs rise at the inflation rate, then EPS will also grow at the inflation rate. Even without inflation, EPS will also grow as a result of the reinvestment, or plowback, of earnings. If the firm's earnings are not all paid out as dividends (that is, if some fraction of earnings is retained), the dollars of investment behind each share will rise over time, which should lead to growth in earnings and dividends.

Even though a stock's value is derived from expected dividends, this does not necessarily mean that corporations can increase their stock prices by simply raising the current dividend. Shareholders care about *all* dividends, both current and those expected in the future. Moreover, there is a trade-off between current dividends, and future dividends. Companies that pay most of their current earnings out as dividends are obviously not retaining and reinvesting much in the business, and that reduces future earnings and dividends. So, the issue is this: Do shareholders prefer higher current dividends at the cost of lower future dividends, lower current dividends, and more growth, or are they indifferent between growth and dividends? As we will see in the chapter on distributions to shareholders, there is no simple answer to this question. Shareholders should prefer to have the company retain earnings, hence pay less current dividends, if it has highly profitable investment opportunities, but they should prefer to have the company pay earnings out if investment opportunities are poor. Taxes also play a role—since capital gains are tax deferred while dividends are taxed immediately, this might lead to a preference for retention and growth over current dividends. We will consider dividend policy in detail later in Part 5 of this text.

When Can the Constant Growth Model Be Used?

The constant growth model is most appropriate for mature companies with a stable history of growth and stable future expectations. Expected growth rates vary somewhat among companies, but dividends for mature firms are often expected to grow in the future at about the same rate as nominal gross domestic product (real GDP plus inflation). On this basis, one might expect the dividends of an average, or "normal," company to grow at a rate of 5 to 8 percent a year.

Zero Growth Stock
A common stock whose future dividends are not expected to grow at all; that is, g = 0.

Note too that Equation 9-2 is sufficiently general to handle the case of a **zero growth stock,** where the dividend is expected to remain constant over time. If $g = 0$, Equation 9-2 reduces to Equation 9-3:

$$\hat{P}_0 = \frac{D}{r_s} \qquad\qquad (9\text{-}3)$$

This is conceptually the same equation as the one we developed in Chapter 2 for a perpetuity, and it is simply the current dividend divided by the discount rate.

SELF TEST

?

Write out and explain the valuation formula for a constant growth stock.

Explain how the formula for a zero growth stock is related to that for a constant growth stock.

A stock is expected to pay a dividend of $1 at the end of the year. The required rate of return is $r_s = 11\%$. What would the stock's price be if the growth rate were 5 percent? What would the price be if $g = 0$? ($16.67; $9.09)

9.5 EXPECTED RATE OF RETURN ON A CONSTANT GROWTH STOCK

We can solve Equation 9-2 for r_s, again using the hat to indicate that we are dealing with an expected rate of return:[5]

$$\begin{matrix} \text{Expected rate} \\ \text{of return} \end{matrix} = \begin{matrix} \text{Expected} \\ \text{dividend yield} \end{matrix} + \begin{matrix} \text{Expected growth rate, or} \\ \text{capital gains yield} \end{matrix}$$

$$\hat{r}_s = \frac{D_1}{P_0} + g \qquad\qquad (9\text{-}4)$$

Thus, if you buy a stock for a price $P_0 = \$23$, and if you expect the stock to pay a dividend $D_1 = \$1.242$ one year from now and to grow at a constant rate $g = 8\%$ in the future, then your expected rate of return will be 13.4 percent:

$$\hat{r}_s = \frac{\$1.242}{\$23} + 8\% = 5.4\% + 8\% = 13.4\%$$

In this form, we see that $\hat{r}_s$ is the *expected total return* and that it consists of an *expected dividend yield*, $D_1/P_0 = 5.4\%$, plus an *expected growth rate or capital gains yield*, $g = 8\%$.

Suppose this analysis had been conducted on January 1, 2006, so $P_0 = \$23$ is the January 1, 2006, stock price, and $D_1 = \$1.242$ is the dividend expected at the end of 2006. What is the expected stock price at the end of 2006? We would again apply Equation 9-2, but this time we would use the year-end dividend, $D_2 = D_1(1 + g) = \$1.242(1.08) = \$1.3414$:

$$\hat{P}_{12/31/06} = \frac{D_{2007}}{r_s - g} = \frac{\$1.3414}{0.134 - 0.08} = \$24.84$$

Notice that $\$24.84$ is 8 percent greater than P_0, the $\$23$ price on January 1, 2006:

$$\$23(1.08) = \$24.84$$

Thus, we would expect to make a capital gain of $\$24.84 - \$23.00 = \$1.84$ during 2006, which would provide a capital gains yield of 8 percent:

$$\text{Capital gains yield}_{2006} = \frac{\text{Capital gain}}{\text{Beginning price}} = \frac{\$1.84}{\$23.00} = 0.08 = 8\%$$

We could extend the analysis on out, and in each future year the expected capital gains yield would always equal g, the expected dividend growth rate. For example, the dividend yield in 2007 could be estimated as follows:

$$\text{Dividend yield}_{2007} = \frac{D_{2007}}{\hat{P}_{12/31/06}} = \frac{\$1.3414}{\$24.84} = 0.054 = 5.4\%$$

The dividend yield for 2008 could also be calculated, and again it would be 5.4 percent. Thus, *for a constant growth stock*, the following conditions must hold:

1. The expected dividend yield is a constant.
2. The dividend is expected to grow forever at a constant rate, g.

*The popular Motley Fool Web site, **http://www.fool.com/school/introductiontovaluation.htm,** provides a good description of some of the benefits and drawbacks of a few of the more commonly used valuation procedures.*

---

[5] The r_s value in Equation 9-2 is a *required* rate of return, but when we transform to obtain Equation 9-4, we are finding an expected rate of return. Obviously, the transformation requires that $r_s = \hat{r}_s$. This equality holds if the stock market is in equilibrium, a condition that we discussed in Chapter 5.

3. The stock price is expected to grow at this same rate.
4. The expected capital gains yield is also a constant, and it is equal to g.

The term *expected* should be clarified—it means expected in a probabilistic sense, as the "statistically expected" outcome. Thus, when we say that the growth rate is expected to remain constant at 8 percent, we mean that the best prediction for the growth rate in any future year is 8 percent, not that we literally expect the growth rate to be exactly 8 percent in each future year. In this sense, the constant growth assumption is reasonable for many large, mature companies.

> **SELF TEST**
>
> What conditions must hold if a stock is to be evaluated using the constant growth model?
>
> What does the term "expected" mean when we say expected growth rate?
>
> Suppose an analyst says that she values GE based on a forecasted growth rate of 6 percent for earnings, dividends, and the stock price. If the growth rate next year turns out to be 5 or 7 percent, would this mean that the analyst's forecast was faulty? Explain.

9.6 VALUING STOCKS EXPECTED TO GROW AT A NONCONSTANT RATE

Supernormal (Nonconstant) Growth
The part of the firm's life cycle in which it grows much faster than the economy as a whole.

For many companies, it is not appropriate to assume that dividends will grow at a constant rate because firms typically go through *life cycles* with different growth rates at different parts of the cycle. During their early years, they generally grow much faster than the economy as a whole; then they match the economy's growth; and finally they grow at a slower rate than the economy.[6] Automobile manufacturers in the 1920s, computer software firms such as Microsoft in the 1980s, and wireless firms in the early 2000s are examples of firms in the early part of the cycle; these firms are called **supernormal,** or **nonconstant, growth** firms. Figure 9-2 illustrates nonconstant growth and also compares it with normal growth, zero growth, and negative growth.[7]

---

[6] The concept of life cycles could be broadened to *product cycle*, which would include both small start-up companies and large companies like Microsoft and Procter & Gamble, which periodically introduce new products that give sales and earnings a boost. We should also mention *business cycles*, which alternately depress and boost sales and profits. The growth rate just after a major new product has been introduced, or just after a firm emerges from the depths of a recession, is likely to be much higher than the "expected long-run average growth rate," which is the proper number for DCF analysis.

[7] A negative growth rate indicates a declining company. A mining company whose profits are falling because of a declining ore body is an example. Someone buying such a company would expect its earnings, and consequently its dividends and stock price, to decline each year, and this would lead to capital losses rather than capital gains. Obviously, a declining company's stock price will be relatively low, and its dividend yield must be high enough to offset the expected capital loss and still produce a competitive total return. Students sometimes argue that they would never be willing to buy a stock whose price was expected to decline. However, if the present value of the expected dividends exceeds the stock price, the stock would still be a good investment that would provide a good return.

FIGURE 9-2   *Illustrative Dividend Growth Rates*
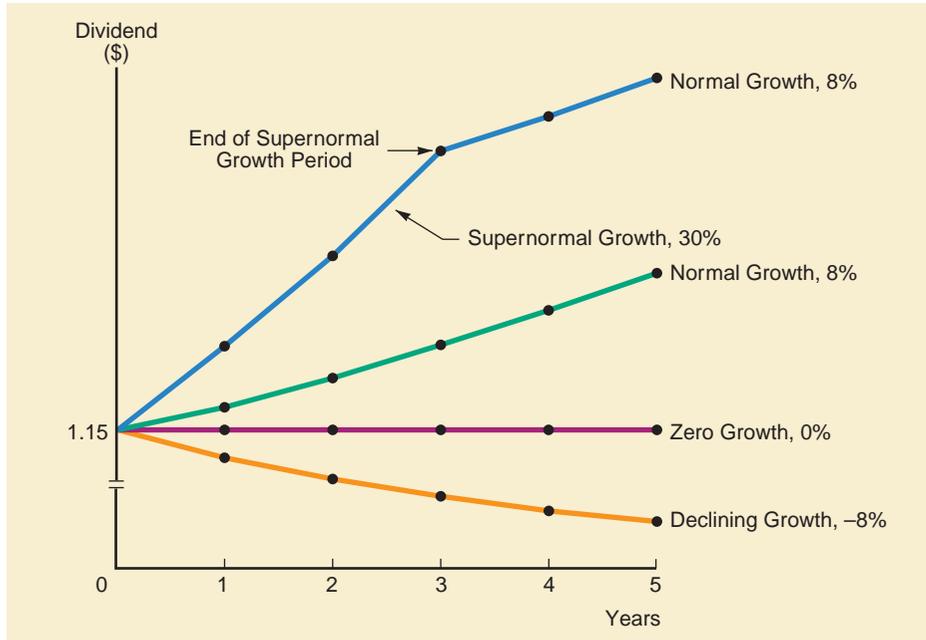
In the figure, the dividends of the supernormal growth firm are expected to grow at a 30 percent rate for three years, after which the growth rate is expected to fall to 8 percent, the assumed average for the economy. The value of this firm's stock, like any other asset, is the present value of its expected future dividends as determined by Equation 9-1. When D_t is growing at a constant rate, we can simplify Equation 9-1 to $\hat{P}_0 = D_1/(r_s - g)$. In the supernormal case, however, the expected growth rate is not a constant—it declines at the end of the period of supernormal growth.

Because Equation 9-2 requires a constant growth rate, we obviously cannot use it to value stocks that have nonconstant growth. However, assuming that a company currently enjoying supernormal growth will eventually slow down and become a constant growth stock, we can combine Equations 9-1 and 9-2 to form a new formula, Equation 9-5, for valuing it.

First, we assume that the dividend will grow at a nonconstant rate (generally a relatively high rate) for N periods, after which it will grow at a constant rate, g. N is often called the **terminal date,** or **horizon date.** Second, we can use the constant growth formula, Equation 9-2, to determine what the stock's **horizon,** or **terminal, value** will be N periods from today:

$$\text{Horizon value} = \hat{P}_N = \frac{D_{N+1}}{r_s - g}$$

The stock's intrinsic value today, $\hat{P}_0$, is the present value of the dividends during the nonconstant growth period plus the present value of the horizon value:

Terminal Date (Horizon Date)
The date when the growth rate becomes constant. At this date it is no longer necessary to forecast the individual dividends.

Horizon (Terminal) Value
The value at the horizon date of all dividends expected thereafter.

$$\hat{P}_0 = \underbrace{\frac{D_1}{(1+r_s)^1} + \frac{D_2}{(1+r_s)^2} + \cdots + \frac{D_N}{(1+r_s)^N}}_{\substack{\text{PV of dividends during the} \\ \text{nonconstant growth} \\ \text{period, } t = 1, \cdots N}} + \underbrace{\frac{D_{N+1}}{(1+r_s)^{N+1}} + \cdots + \frac{D_\infty}{(1+r_s)^\infty}}_{\substack{\text{Horizon value} = \text{PV of dividends} \\ \text{during the constant growth} \\ \text{period, } t = N+1, \cdots \infty}}$$

$$\hat{P}_0 = \underbrace{\frac{D_1}{(1+r_s)^1} + \frac{D_2}{(1+r_s)^2} + \cdots + \frac{D_N}{(1+r_s)^N}}_{\substack{\text{PV of dividends during the} \\ \text{nonconstant growth period} \\ t = 1, \cdots N}} + \underbrace{\frac{\hat{P}_N}{(1+r_s)^N}}_{\substack{\text{PV of horizon} \\ \text{value, } \hat{P}_N: \\ \frac{[(D_{N+1})/(r_s-g)]}{(1+r_s)^N}}} \tag{9-5}$$

To implement Equation 9-5, we go through the following three steps:

1. Find the PV of each dividend during the period of nonconstant growth and sum them.
2. Find the expected price of the stock at the end of the nonconstant growth period, at which point it has become a constant growth stock so it can be valued with the constant growth model, and discount this price back to the present.
3. Add these two components to find the intrinsic value of the stock, $\hat{P}_0$.

Figure 9-3 can be used to illustrate the process for valuing nonconstant growth stocks. Here we assume the following five facts exist:

r_s = stockholders' required rate of return = 13.4%. This rate is used to discount the cash flows.

N = years of nonconstant growth = 3.

g_s = rate of growth in both earnings and dividends during the nonconstant growth period = 30%. This rate is shown directly on the time line. (Note: The growth rate during the nonconstant growth period could vary from year to year. Also, there could be several different nonconstant growth periods, for example, 30 percent for three years, then 20 percent for three years, and then a constant 8 percent.)

g_n = rate of normal, constant growth after the nonconstant period = 8%. This rate is also shown on the time line, between Periods 3 and 4.

D_0 = last dividend the company paid = $1.15.

The valuation process as diagrammed in Figure 9-3 is explained in the steps set forth below the time line. The value of the nonconstant growth stock is calculated to be $39.21.

Note that in this example we have assumed a relatively short three-year horizon to keep things simple. When evaluating stocks, most analysts would use a much longer horizon (for example, 10 years) to estimate intrinsic values. This

FIGURE 9-3 *Process for Finding the Value of a Nonconstant Growth Stock*
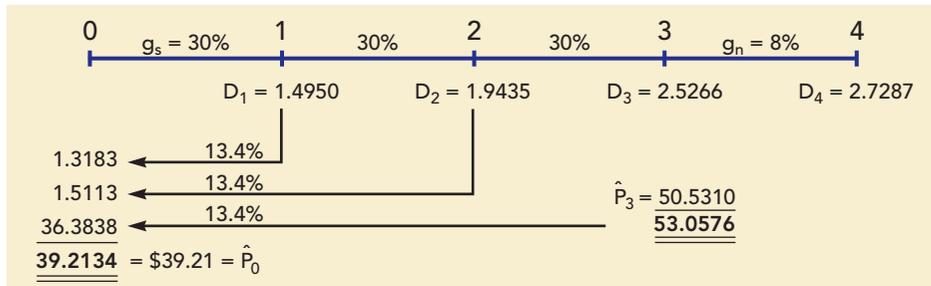
Notes to Figure 9-3:

Step 1. Calculate the dividends expected at the end of each year during the nonconstant growth period. Calculate the first dividend, $D_1 = D_0(1 + g_s) = \$1.15(1.30) = \$1.4950$. Here g_s is the growth rate during the three-year nonconstant growth period, 30 percent. Show the $1.4950 on the time line as the cash flow at Time 1. Then, calculate $D_2 = D_1(1 + g_s) = \$1.4950(1.30) = \$1.9435$, and then $D_3 = D_2(1 + g_s) = \$1.9435(1.30) = \$2.5266$. Show these values on the time line as the cash flows at Time 2 and Time 3. Note that D_0 is used only to calculate D_1.

Step 2. The price of the stock is the PV of dividends from Time 1 to infinity, so in theory we could project each future dividend, with the normal growth rate, $g_n = 8\%$, used to calculate D_4 and subsequent dividends. However, we know that after D_3 has been paid, which is at Time 3, the stock becomes a constant growth stock. Therefore, we can use the constant growth formula to find $\hat{P}_3$, which is the PV of the dividends from Time 4 to infinity as evaluated at Time 3.

First, we determine $D_4 = \$2.5266(1.08) = \$2.7287$ for use in the formula, and then we calculate $\hat{P}_3$ as follows:

$$\hat{P}_3 = \frac{D_4}{r_s - g_n} = \frac{\$2.7287}{0.134 - 0.08} = \$50.5310$$

We show this $50.5310 on the time line as a second cash flow at Time 3. The $50.5310 is a Time 3 cash flow in the sense that the stockholder could sell it for $50.5310 at Time 3 and also in the sense that $50.5310 is the present value of the dividend cash flows from Time 4 to infinity. Note that the total cash flow at Time 3 consists of the sum of $D_3 + \hat{P}_3 = \$2.5266 + \$50.5310 = \$53.0576$.

Step 3. Now that the cash flows have been placed on the time line, we can discount each cash flow at the required rate of return, $r_s = 13.4\%$. We could discount each cash flow by dividing by $(1.134)^t$, where $t = 1$ for Time 1, $t = 2$ for Time 2, and $t = 3$ for Time 3. This produces the PVs shown to the left below the time line, and the sum of the PVs is the value of the nonconstant growth stock, $39.21.

With a financial calculator, you can find the PV of the cash flows as shown on the time line with the cash flow (CFLO) register of your calculator. Enter 0 for CF_0 because you receive no cash flow at Time 0, $CF_1 = 1.495$, $CF_2 = 1.9435$, and $CF_3 = 2.5266 + 50.5310 = 53.0576$. Then enter $I/YR = 13.4$, and press the NPV key to find the value of the stock, $39.21.

requires a few more calculations, but analysts use spreadsheets so the arithmetic is not a problem. In practice, the real limitation is obtaining reliable forecasts for future growth.

Explain how one would find the value of a nonconstant growth stock.

Explain what is meant by "terminal (horizon) date" and "horizon (terminal) value."

Evaluating Stocks That Don't Pay Dividends

The dividend growth model assumes that the firm is currently paying a dividend. However, many firms, even highly profitable ones, including Cisco, Dell, and Apple, have never paid a dividend. If a firm is expected to begin paying dividends in the future, we can modify the equations presented in the chapter and use them to determine the value of the stock.

A new business often expects to have low sales during its first few years of operation as it develops its product. Then, if the product catches on, sales will grow rapidly for several years. Sales growth brings with it the need for additional assets—a firm cannot increase sales without also increasing its assets, and asset growth requires an increase in liability and/or equity accounts. Small firms can generally obtain some bank credit, but they must maintain a reasonable balance between debt and equity. Thus, additional bank borrowings require increases in equity, and getting the equity capital needed to support growth can be difficult for small firms. They have limited access to the capital markets, and, even when they can sell common stock, their owners are reluctant to do so for fear of losing voting control. Therefore, the best source of equity for most small businesses is retained earnings, and for this reason most small firms pay no dividends during their rapid growth years. Eventually, though, successful small firms do pay dividends, and those dividends generally grow rapidly at first but slow down to a sustainable constant rate once the firm reaches maturity.

If a firm currently pays no dividends but is expected to pay dividends in the future, the value of its stock can be found as follows:

1. Estimate when dividends will be paid, the amount of the first dividend, the growth rate during the supernormal growth period, the length of the supernormal period, the long-run (constant) growth rate, and the rate of return required by investors.
2. Use the constant growth model to determine the price of the stock after the firm reaches a stable growth situation.
3. Set out on a time line the cash flows (dividends during the supernormal growth period and the stock price once the constant growth state is reached), and then find the present value of these cash flows. That present value represents the value of the stock today.

To illustrate this process, consider the situation for MarvelLure Inc., a company that was set up in 2004 to produce and market a new high-tech fishing lure. MarvelLure's sales are currently growing at a rate of 200 percent per year. The company expects to experience a high but declining rate of growth in sales and earnings during the next 10 years, after which analysts estimate that it will grow at a steady 10 percent per year. The firm's management has announced that it will pay no dividends for five years, but if earnings materialize as forecasted, it will pay a dividend of $0.20 per share at the end of Year 6, $0.30 in Year 7, $0.40 in Year 8, $0.45 in Year 9, and $0.50 in Year 10. After Year 10, current plans are to increase dividends by 10 percent per year.

MarvelLure's investment bankers estimate that investors require a 15 percent return on similar stocks. Therefore, we find the value of a share of MarvelLure's stock as follows:

$$P_0 = \frac{\$0}{(1.15)^t} + \cdots + \frac{\$0}{(1.15)^5} + \frac{\$0.20}{(1.15)^6}$$

$$+ \frac{\$0.30}{(1.15)^7} + \frac{\$0.40}{(1.15)^8}$$

$$+ \frac{\$0.45}{(1.15)^9} + \frac{\$0.50}{(1.15)^{10}}$$

$$+ \left(\frac{\$0.50(1.10)}{0.15 - 0.10}\right)\left(\frac{1}{(1.15)^{10}}\right)$$

$$= \$3.30$$

The last term finds the expected price of the stock in Year 10 and then finds the present value of that price. Thus, we see that the dividend growth model can be applied to firms that currently pay no dividends, provided we can estimate future dividends with a fair degree of confidence. However, in many cases we can have more confidence in the forecasts of free cash flows, and in these situations it is better to use the corporate valuation model as discussed in the next section.

9.7 VALUING THE ENTIRE CORPORATION[8]

Thus far we have discussed the discounted dividend approach to valuing a firm's common stock. This procedure is widely used, but it is based on the assumption that the analyst can forecast future dividends reasonably well. This is often true for mature companies that have a history of steady dividend payments. The model can be applied to firms that are not paying dividends, but as we show in the preceding box, this requires forecasting the time at which the firm will commence paying dividends, the amount of the initial dividend, and the growth rate of dividends once they commence. This suggests that a reliable dividend forecast must be based on forecasts of the firm's future sales, costs, and capital requirements.

An alternative approach, the **total company, or corporate valuation, model,** can be used to value firms in situations where future dividends are not easily predictable. Consider a start-up formed to develop and market a new product. Such companies generally expect to have low sales during their first few years as they develop and begin to market their products. Then, if the products catch on, sales will grow rapidly for several years. For example, eBay's sales were $48 million in 1998, the year it first went public, but in 1999 sales grew by nearly 400 percent and they hit $4.5 billion in 2005. Obviously, eBay has been more successful than most new businesses, but growth rates of 100, 500, or even 1,000 percent are not uncommon during a firm's early years.

Growing sales require additional assets—and eBay could not have grown without increasing its assets. Over the five-year period 1999–2004, its sales grew by 658 percent, and that growth required a 583 percent increase in assets. The increase in assets had to be financed, so eBay's liability and equity accounts also grew by 583 percent as was required to keep the balance sheet in balance.

Small firms can generally borrow some funds from their bank, but banks insist that the debt/equity ratio be kept at a reasonable level, which means that equity must also be raised. However, small firms have little or no access to the stock market, so they generally obtain new equity by retaining earnings, which means that they pay little or no dividends during their rapid growth years. Eventually, though, most successful firms do pay dividends, and those dividends grow rapidly at first but then slow down as the firm approaches maturity. It is difficult to forecast the future dividend stream of any firm that is expected to go through such a transition, and even in the case of large firms such as Cisco, Dell, and Apple that have never paid a dividend, it's hard to forecast when dividends will commence and how large they will be.

Another problem arises when it is necessary to find the value of a division as opposed to an entire firm. For example, in 2005 Kerr-McGee, a large oil and chemical company, decided to sell its chemical division. The parent company had been paying dividends for many years, so the discounted dividend model could be applied to it. However, the chemical division had no history of dividends, and it would likely be bought by another chemical company and folded into the purchaser's other operations. How could Kerr-McGee's chemical division be valued? The answer is, "Use the corporate valuation model as discussed in this section."

Total Company or Corporate Valuation Model
A valuation model used as an alternative to the dividend growth model to determine the value of a firm, especially one with no history of dividends or a division of a larger firm. This model first calculates the firm's free cash flows and then finds their present value to determine the firm's value.

---

[8] The corporate valuation model presented in this section is widely used by analysts, and it is in many respects superior to the discounted dividend model. However, it is rather involved as it requires the estimation of sales, costs, and cash flows on out into the future before beginning the discounting process. Therefore, some instructors may prefer to omit Section 9.7 and skip to Section 9.8 in the introductory course.

The Corporate Valuation Model

In Chapter 3 we explained that a firm's value is determined by its ability to generate cash flow, both now and in the future. Therefore, market value can be expressed as follows:

$$\frac{\text{Market}}{\text{value}} = V_{\text{Company}} = \text{PV of expected future free cash flows of company}$$

$$= \frac{\text{FCF}_1}{(1 + \text{WACC})^1} + \frac{\text{FCF}_2}{(1 + \text{WACC})^2} + \cdots + \frac{\text{FCF}_\infty}{(1 + \text{WACC})^\infty} \quad \textbf{(9-6)}$$

Here FCF_t is the free cash flow in Year t and WACC is the weighted average cost of the firm's capital.

Recall from Chapter 3 that free cash flow is the cash inflow during a given year less the cash needed to finance required asset additions. Inflows are equal to net after-tax operating income (also called NOPAT) plus noncash charges (depreciation and amortization), which were deducted when calculating NOPAT, while the required asset additions are the capital expenditures plus the net addition to working capital. This was discussed in Chapter 3, where we developed the following equation:

$$\text{FCF} = \left[\text{EBIT}(1 - \text{T}) + \frac{\text{Depreciation}}{\text{and amortization}}\right] - \left[\begin{array}{c} \text{Capital} \\ \text{expenditures} \end{array} + \begin{array}{c} \Delta \text{ Net} \\ \text{operating} \\ \text{working} \\ \text{capital} \end{array}\right]$$

Depreciation and amortization can be shifted from the first bracketed term to the second term (and given a minus sign). Then the first term becomes $\text{EBIT}(1 - \text{T})$, also called *NOPAT*, and the second term becomes the *net (rather than gross) new investment in operating capital*. The result is Equation 9-7, which shows that free cash flow is equal to after-tax operating income (NOPAT) less the net new investment in operating capital:

$$\text{FCF} = \text{NOPAT} - \text{Net new investment in operating capital} \quad \textbf{(9-7)}$$

Turning to the discount rate, WACC, note first that free cash flow is the cash generated *before making any payments to any investors—the common stockholders, preferred stockholders, and bondholders—and that cash flow must provide a return to all these investors*. Each of these investor groups has a required rate of return that depends on the risk of the particular security, and as we discuss in Chapter 10, the average of those required returns is the WACC.

With this background, we can summarize the steps used to implement the corporate valuation model. This type of analysis is performed both internally by the firm's financial staff and also by external security analysts, who are generally experts on the industry and quite familiar with the firm's history and future plans. For illustrative purposes, we discuss an analysis conducted by Susan Buskirk, senior food analyst for the investment banking firm Morton Staley and Company. Her analysis is summarized in Table 9-1, which was reproduced from the chapter *Excel* model.

- Based on Allied's history and her knowledge of the firm's business plan, Susan estimated sales, costs, and cash flows on an annual basis for five years. Growth will vary during those years, but she assumes that things will stabilize and growth will be constant after the fifth year. She could have projected variability for more years if she thought it would take longer to reach a steady-state, constant growth situation.

TABLE 9-1 — Allied Food Products: Free Cash Flow Valuation

	A	B	C	D	E	F	G	H
133	**Part 1. Key Inputs**			**Forecasted Years**				
134				**2006**	**2007**	**2008**	**2009**	**2010**
135	Sales growth rate			10.0%	9.0%	9.0%	9.0%	8.0%
136	Operating costs as a % of sales			87.0%	87.0%	86.0%	85.0%	85.0%
137	Growth in operating capital			8.0%	8.0%	8.0%	8.0%	8.0%
138	Depr'n as a % of operating capital			6.0%	8.0%	7.0%	7.0%	7.0%
139	Tax rate			40%				
140	WACC			10%				
141	Long-run FCF growth, g_{LR}			6.0%				
142								
143	**Part 2. Forecast of Cash Flows During Period of Nonconstant Growth**							
144			**Historical**	**Forecasted Years**				
145			**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
146								
147	Sales		$3,000.0	$3,300.0	$3,597.0	$3,920.7	$4,273.6	$4,615.5
148	Operating costs		2,616.2	2,871.0	3,129.4	3,371.8	3,632.6	3,923.2
149	Depreciation		100.0	116.6	168.0	158.7	171.4	185.1
150	EBIT		$283.8	$312.4	$299.6	$390.2	$469.6	$507.2
151	NOPAT = EBIT x (1-T)		$170.3	$187.4	$179.8	$234.1	$281.8	$304.3
152								
153	Total operating capital		$1,800.0	$1,944.0	$2,099.5	$2,267.5	$2,448.9	$2,644.8
154	Net new operating cap		280	144.0	155.5	168.0	181.4	195.9
155	Free Cash Flow, FCF		−$109.7	$43.4	$24.3	$66.1	$100.4	$108.4
156	*PV of FCFs*		*N.A.*	*$39.5*	*$20.1*	*$49.7*	*$68.6*	*$67.3*
157								
158	**Part 3. Terminal Value and Intrinsic Value Estimation**							
159	*Estimated Value at the Horizon, 2010*							
160	Free Cash Flow (2011)			$114.9				
161	Terminal Value at 2010, TV			$2,872.7				
162	PV of the 2010 TV			$1,783.7				
163								
164	*Calculation of Firm's Intrinsic Value*							
165	Sum of PVs of FCFs, 2006-2010			$245.1				
166	PV of 2010 TV			$1,783.7				
167	Total corporate value			$2,028.8				
168	Less: market value of debt and pfd			$860.0				
169	Intrinsic value of common equity			$1,168.8				
170	Shares outstanding (millions)			50.0				
171								
172	Intrinsic Value Per Share			$23.38				

Formulas referenced in Part 3:

$$FCF_{2010}(1+g_{LR})$$

$$TV_{2010} = \frac{FCF_{2011}}{WACC - g}$$

$$TV / (1+WACC)^N$$

- Susan next calculated the expected free cash flows (FCFs) for each of the five nonconstant growth years, and she found the PV of those cash flows, discounted at the WACC.
- After Year 5 she assumed that FCF growth would be constant, hence the constant growth model could be used to find Allied's total market value at Year 5. This "horizon, or terminal, value" is the sum of the PVs of the FCFs from Year 6 on out into the future, discounted back to Year 5 at the WACC.
- Next, she discounted the Year 5 terminal value back to the present to find its PV at Year 0.
- She then summed all the PVs, the annual cash flows during the nonconstant period plus the PV of the horizon value, to find the firm's estimated total market value.
- She then subtracted the value of the debt and preferred stock to find the value of the common equity.

Other Approaches to Valuing Common Stocks

While the dividend growth and the corporate value models presented in this chapter are the most widely used methods for valuing common stocks, they are by no means the only approaches. Analysts often use a number of different techniques to value stocks. Two of these alternative approaches are described here.

The P/E Multiple Approach

Investors have long looked for simple rules of thumb to determine whether a stock is fairly valued. One such approach is to look at the stock's price-to-earnings (P/E) ratio. Recall from Chapter 4 that a company's P/E ratio shows how much investors are willing to pay for each dollar of reported earnings. As a starting point, you might conclude that stocks with low P/E ratios are undervalued, since their price is "low" given current earnings, while stocks with high P/E ratios are overvalued.

Unfortunately, however, valuing stocks is not that simple. We should not expect all companies to have the same P/E ratio. P/E ratios are affected by risk—investors discount the earnings of riskier stocks at a higher rate. Thus, all else equal, riskier stocks should have lower P/E ratios. In addition, when you buy a stock, you not only have a claim on current earn-

ings—you also have a claim on all future earnings. All else equal, companies with stronger growth opportunities will generate larger future earnings and thus should trade at higher P/E ratios. Therefore, eBay is not necessarily overvalued just because its P/E ratio is 52.8 at a time when the median firm has a P/E of 20.1. Investors believe that eBay's growth potential is well above average. Whether the stock's future prospects justify its P/E ratio remains to be seen, but in and of itself a high P/E ratio does not mean that a stock is overvalued.

Nevertheless, P/E ratios can provide a useful starting point in stock valuation. If a stock's P/E ratio is well above its industry average, and if the stock's growth potential and risk are similar to other firms in the industry, this may indicate that the stock's price is too high. Likewise, if a company's P/E ratio falls well below its historical average, this may signal that the stock is undervalued—particularly if the company's growth prospects and risk are unchanged, and if the overall P/E for the market has remained constant or increased.

One obvious drawback of the P/E approach is that it depends on reported accounting earnings. For this reason, some analysts choose to rely on other multiples to value stocks. For example, some analysts

- Finally, she divided the equity value by the number of shares outstanding, and the result was her estimate of Allied's intrinsic value per share. This value was quite close to the stock's market price, so she concluded that Allied's stock is priced at its equilibrium level. Consequently, she issued a "Hold" recommendation on the stock. If the estimated intrinsic value had been significantly below the market price, she would have issued a "Sell" recommendation, and had it been well above, she would have called the stock a "Buy."

Comparing the Total Company and Dividend Growth Models

Analysts use both the discounted dividend model and the corporate model when valuing mature, dividend-paying firms, and they generally use the corporate model when valuing firms that do not pay dividends and divisions. In principle, we should find the same intrinsic value using either model, but differences are often observed. When a conflict exists, then the assumptions embedded in the corporate model can be reexamined, and once the analyst is convinced they are reasonable, then the results of that model are used. In our Allied example, the estimates were extremely close—the dividend growth model predicted a price of $23.00 per share versus $23.38 using the total company model, and both are essentially equal to Allied's actual $23 price.

look at a company's price-to-cash-flow ratio, while others look at the price-to-sales ratio.

The EVA Approach

In recent years, analysts have looked for more rigorous alternatives to the dividend growth model. More than a quarter of all stocks listed on the NYSE pay no dividends. This proportion is even higher on Nasdaq. While the dividend growth model can still be used for these stocks (see box, "Evaluating Stocks That Don't Pay Dividends"), this approach requires that analysts forecast when the stock will begin paying dividends, what the dividend will be once it is established, and the future dividend growth rate. In many cases, these forecasts contain considerable errors.

An alternative approach is based on the concept of Economic Value Added (EVA), which we discussed back in Chapter 3. Also, recall from the box in Chapter 4 entitled, "EVA and ROE" that EVA can be written as

$$(\text{Equity capital})(\text{ROE} - \text{Cost of equity capital})$$

This equation suggests that companies can increase their EVA by investing in projects that provide shareholders with returns that are above their cost of capital, which is the return they could expect to earn on alternative investments with the same level of risk. When you buy stock in a company, you receive more than just the book value of equity—you also receive a claim on all future value that is created by the firm's managers (the present value of all future EVAs). It follows that a company's market value of equity can be written as

$$\begin{array}{ccc} \text{Market value} \\ \text{of equity} \end{array} = \begin{array}{c} \text{Book} \\ \text{value} \end{array} + \begin{array}{c} \text{PV of all} \\ \text{future EVAs} \end{array}$$

We can find the "fundamental" value of the stock, P_0, by simply dividing the above expression by the number of shares outstanding.

As is the case with the dividend growth model, we can simplify the above expression by assuming that at some point in time annual EVA becomes a perpetuity, or grows at some constant rate over time.[a]

[a] What we have presented here is a simplified version of what is often referred to as the Edwards-Bell-Ohlson (EBO) model. For a more complete description of this technique and an excellent summary of how it can be used in practice, take a look at the article "Measuring Wealth," by Charles M. C. Lee, in *CA Magazine*, April 1996, pp. 32–37.

In practice, intrinsic value estimates based on the two models normally deviate both from one another and from actual stock prices, leading different analysts to reach different conclusions about the attractiveness of a given stock. The better the analyst, the more often his or her valuations will turn out to be correct, but no one can make perfect predictions because too many things can change randomly and unpredictably in the future. Given all this, does it matter whether you use the total company model or the dividend growth model to value stocks? We would argue that it does. If we had to value, say, 100 mature companies whose dividends were expected to grow steadily in the future, we would probably use the dividend growth model. Here we would only need to estimate the growth rate in dividends, not the entire set of pro forma financial statements, hence it would be more feasible to use the dividend model.

However, if we were studying just one or a few companies, especially companies still in the high-growth stage of their life cycles, we would want to project future financial statements before estimating future dividends. Then, because we would already have projected future financial statements, we would go ahead and apply the total company model. Intel, which pays a quarterly dividend of 8 cents versus quarterly earnings of about $1.24, is an example of a company where either model could be used, but we think the corporate model would be better.

Now suppose you were trying to estimate the value of a company that has never paid a dividend, such as eBay, or a new firm that is about to go public, or

Kerr-McGee's chemical division that it plans to sell. In all of these situations, you would be much better off using the corporate valuation model. Actually, even if a company is paying steady dividends, much can be learned from the corporate valuation model, so analysts today use it for all types of valuations. The process of projecting future financial statements can reveal a great deal about the company's operations and financing needs. Also, such an analysis can provide insights into actions that might be taken to increase the company's value, and for this reason it is integral to the planning and forecasting process, as we discuss in a later chapter.

SELF TEST

? Write out the equation for free cash flows, and explain it.

Why might someone use the corporate valuation model even for companies that have a history of paying dividends?

What steps are taken to find a stock price as based on the firm's total value?

Why might the calculated intrinsic stock value differ from the stock's current market price? Which would be "correct," and what does "correct" mean?

9.8 STOCK MARKET EQUILIBRIUM

Recall that r_X, the required return on Stock X, can be found using the Security Market Line (SML) equation from the Capital Asset Pricing Model (CAPM) as discussed back in Chapter 8:

$$r_X = r_{RF} + (r_M - r_{RF})b_X = r_{RF} + (RP_M)b_X$$

If the risk-free rate is 6 percent, the market risk premium is 5 percent, and Stock X has a beta of 2, then the marginal investor would require a return of 16 percent on the stock:

$$r_X = 6\% + (5\%)2.0$$

$$= 16\%$$

This 16 percent required return is shown as the point on the SML in Figure 9-4 associated with beta = 2.0.

Marginal Investor
A representative investor whose actions reflect the beliefs of those people who are currently trading a stock. It is the marginal investor who determines a stock's price.

A **marginal investor** will buy Stock X if its expected return is more than 16 percent, will sell it if the expected return is less than 16 percent, and will be indifferent, hence will hold but not buy or sell, if the expected return is exactly 16 percent. Now suppose the investor's portfolio contains Stock X, and he or she analyzes its prospects and concludes that its earnings, dividends, and price can be expected to grow at a constant rate of 5 percent per year. The last dividend was $D_0 = \$2.8571$, so the next expected dividend is
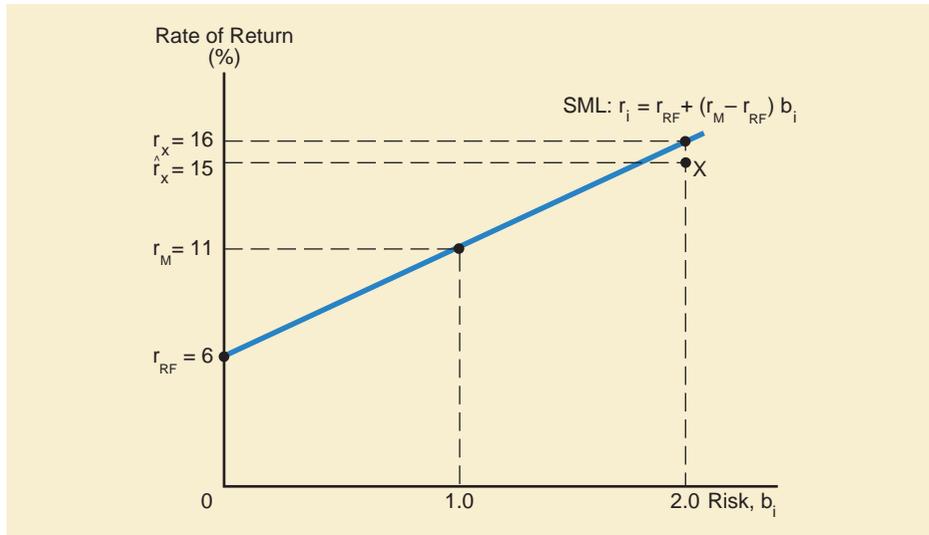
$$D_1 = \$2.8571(1.05) = \$3$$

The investor observes that the present price of the stock, P_0, is \$30. Should he or she buy more of Stock X, sell the stock, or maintain the present position?

The investor can calculate Stock X's *expected rate of return* as follows:

$$\hat{r}_X = \frac{D_1}{P_0} + g = \frac{\$3}{\$30} + 5\% = 15\%$$

FIGURE 9-4   *Expected and Required Returns on Stock X*

This value is plotted on Figure 9-4 as Point X, which is below the SML. Because the expected rate of return is less than the required return, he or she, and many other investors, would want to sell the stock. However, few people would want to buy at the $30 price, so the present owners would be unable to find buyers unless they cut the price of the stock. Thus, the price would decline, and the decline would continue until the price hit $27.27. At that point the stock would be in **equilibrium,** defined as the price at which the expected rate of return, 16 percent, is equal to the required rate of return:

$$\hat{r}_X = \frac{\$3}{\$27.27} + 5\% = 11\% + 5\% = 16\% = r_X$$

Had the stock initially sold for less than $27.27, say, $25, events would have been reversed. Investors would have wanted to purchase the stock because its expected rate of return would have exceeded its required rate of return, buy orders would have come in, and the stock's price would be driven up to $27.27.

To summarize, in equilibrium two related conditions must hold:

1. A stock's expected rate of return as seen by the marginal investor must equal its required rate of return: $\hat{r}_i = r_i$.
2. The actual market price of the stock must equal its intrinsic value as estimated by the marginal investor: $P_0 = \hat{P}_0$.

Of course, some individual investors may believe that $\hat{r}_i > r_i$ and $\hat{P}_0 > P_0$, hence they would invest most of their funds in the stock, while other investors might have an opposite view and thus sell all of their shares. However, investors at the margin establish the actual market price, and for these investors, we must have $\hat{r}_i = r_i$ and $\hat{P}_0 = P_0$. If these conditions do not hold, trading will occur until they do.

Changes in Equilibrium Stock Prices

Stock prices are not constant—they undergo violent changes at times. For example, on October 27, 1997, the Dow Jones Industrials fell 554 points, a 7.18 percent

Equilibrium
The condition under which the expected return on a security is just equal to its required return, $\hat{r} = r$. Also, $\hat{P} = P_0$, and the price is stable.

drop in value. Even worse, on October 19, 1987, the Dow lost 508 points, causing an average stock to lose 23 percent of its value on that one day, and some individual stocks lost more than 70 percent. To see what could cause such changes to occur, assume that Stock X is in equilibrium, selling at a price of $27.27 per share. If all expectations were exactly met, during the next year the price would gradually rise to $28.63, or by 5 percent. However, suppose conditions changed as indicated in the second column of the following table:

	VARIABLE VALUE	
	Original	New
Risk-free rate, r_{RF}	6%	5%
Market risk premium, $r_M - r_{RF}$	5%	4%
Stock X's beta coefficient, b_X	2.0	1.25
Stock X's expected growth rate, g_X	5%	6%
D_0	$2.8571	$2.8571
Price of Stock X	$27.27	?

Now give yourself a test: How would the change in each variable, by itself, affect the price, and what new price would result?

Every change, taken alone, would lead to an *increase* in the price. The first three changes all lower r_X, which declines from 16 to 10 percent:

$$\text{Original } r_x = 6\% + 5\%(2.0) = 16\%$$

$$\text{New } r_x = 5\% + 4\%(1.25) = 10\%$$

Using these values, together with the new g, we find that $\hat{P}_0$ rises from $27.27 to $75.71, or by 178 percent:[9]

$$\text{Original } \hat{P}_0 = \frac{\$2.8571(1.05)}{0.16 - 0.05} = \frac{\$3}{0.11} = \$27.27$$

$$\text{New } \hat{P}_0 = \frac{\$2.8571(1.06)}{0.10 - 0.06} = \frac{\$3.0285}{0.04} = \$75.71$$

Note too that at the new price, the expected and required rates of return will be equal:[10]

$$\hat{r}_X = \frac{\$3.0285}{\$75.71} + 6\% = 10\% = r_X$$

Evidence suggests that stocks, especially those of large companies, adjust rapidly when their fundamental positions change. Such stocks are followed closely by a number of security analysts, so as soon as things change, so does the stock price. Consequently, equilibrium ordinarily exists for any given stock, and required and expected returns are generally close to equal. Stock prices certainly

---

[9] A price change of this magnitude is by no means rare. The prices of *many* stocks double or halve during a year. For example, during 2004, Starbucks Corporation, which operates a chain of retail stores that sell whole bean coffees, increased in value by 88.1 percent. Novellus Systems, a semiconductor equipment manufacturer, fell by 33.3 percent.

[10] It should be obvious by now that *actual realized* rates of return are not necessarily equal to expected and required returns. Thus, an investor might have expected to receive a return of 15 percent if he or she had bought Novellus or Starbucks stock in 2004, but, after the fact, the realized return on Starbucks was far above 15 percent, whereas that on Novellus was far below.

change, sometimes violently and rapidly, but this simply reflects changing conditions and expectations. There are, of course, times when a stock will continue to react for several months to unfolding favorable or unfavorable developments. However, this does not signify a long adjustment period; rather, it simply indicates that as more new information about the situation becomes available, the market adjusts to it.

For a stock to be in equilibrium, what two conditions must hold?

If a stock is not in equilibrium, explain how financial markets adjust to bring it into equilibrium.

9.9 INVESTING IN INTERNATIONAL STOCKS

As noted in Chapter 8, the U.S. stock market amounts to only 40 percent of the world stock market, and as a result many U.S. investors hold at least some foreign stock. Analysts have long touted the benefits of investing overseas, arguing that foreign stocks both improve diversification and provide good growth opportunities. For example, after the U.S. stock market rose an average of 17.5 percent a year during the 1980s, many analysts thought that the U.S. market in the 1990s was due for a correction, and they suggested that investors should increase their holdings of foreign stocks.

To the surprise of many, however, U.S. stocks outperformed foreign stocks in the 1990s—they gained about 15 percent a year versus only 3 percent for foreign stocks. However, the Dow Jones STOXX Index (which tracks 600 European companies) outperformed the S&P 500 from 2002 through 2004. Table 9-2 shows how stocks in different countries performed in 2004. Column 2 indicates how stocks in each country performed in terms of the U.S. dollar, while Column 3 shows how the country's stocks performed in terms of its local currency. For example, in 2004 Brazilian stocks rose by 25.12 percent, but the Brazilian real increased over 11 percent versus the U.S. dollar. Therefore, if U.S. investors had bought Brazilian stocks, they would have made 25.12 percent in Brazilian real terms, but those Brazilian reals would have bought 11.1 percent more U.S. dollars, so the effective return would have been 36.22 percent. Thus, the results of foreign investments depend in part on what happens to the exchange rate. Indeed, when you invest overseas, you are making two bets: (1) that foreign stocks will increase in their local markets, and (2) that the currencies in which you will be paid will rise relative to the dollar. For Brazil and most of the other countries shown in Table 9-2, both of these situations occurred during 2004.

Although U.S. stocks have generally outperformed foreign stocks in recent years, this by no means suggests that investors should avoid foreign stocks. Holding some foreign investments still improves diversification, and it is inevitable that there will be years when foreign stocks outperform domestic stocks, such as the period from 2002–2004. When this occurs, U.S. investors will be glad they put some of their money into overseas markets.

What are the key benefits of adding foreign stocks to a portfolio?

When a U.S. investor purchases foreign stocks, what two things is he or she hoping will happen?

Text not available due to copyright restrictions

9.10 PREFERRED STOCK

Preferred stock is a *hybrid*—it is similar to bonds in some respects and to common stock in others. This hybrid nature becomes apparent when we try to classify preferred in relation to bonds and common stock. Like bonds, preferred stock has a par value and a fixed dividend that must be paid before dividends can be paid on the common stock. However, the directors can omit (or "pass") the preferred dividend without throwing the company into bankruptcy. So, although preferred stock calls for a fixed payment like bonds, not making the payment will not lead to bankruptcy.

As noted earlier, a preferred stock entitles its owners to regular, fixed dividend payments. If the payments last forever, the issue is a *perpetuity* whose value, V_p, is found as follows:

$$V_p = \frac{D_p}{r_p} \qquad\qquad \text{(9-8)}$$

V_p is the value of the preferred stock, D_p is the preferred dividend, and r_p is the required rate of return on the preferred. Allied Food has no preferred outstanding, but suppose it did, and this stock paid a dividend of $10 per year. If its required return were 10.3 percent, then the preferred's value would be $97.09, found as follows:

$$V_p = \frac{\$10.00}{0.103} = \$97.09$$

In equilibrium, the expected return, $\hat{r}_p$, must be equal to the required return, r_p. Thus, if we know the preferred's current price and dividend, we can solve for the expected rate of return as follows:

$$\hat{r}_p = \frac{D_p}{V_p} \qquad\qquad \text{(9-8a)}$$

Some preferreds have a stated maturity, often 50 years. Assume that our illustrative preferred matured in 50 years, paid a $10 annual dividend, and had a required return of 8 percent. We could then find its price as follows: Enter N = 50, I/YR = 8, PMT = 10, and FV = 100. Then press PV to find the price, V_p = $124.47. If r_p = 10 percent, change I/YR to 10, in which case V_p = PV = $100. If you know the price of a share of preferred stock, you can solve for I/YR to find the expected rate of return, $\hat{r}_p$.

> **SELF TEST**
>
> **?** Explain the following statement: "Preferred stock is a hybrid security."
>
> Is the equation used to value preferred stock more like the one used to evaluate a bond or the one used to evaluate a "normal," constant growth common stock? Explain.

GLOBAL PERSPECTIVES

Investing in Emerging Markets

Given the possibilities of better diversification and higher returns, U.S. investors have been putting more and more money into foreign stocks. While most investors limit their foreign holdings to developed countries such as Japan, Germany, Canada, and the United Kingdom, some have broadened their portfolios to include emerging markets such as South Korea, Mexico, Singapore, Taiwan, and Russia.

Emerging markets provide opportunities for larger returns, but they also entail greater risks. For example, Russian stocks rose more than 150 percent in the first half of 1996, as it became apparent that Boris Yeltsin would be reelected president. By contrast, if you had invested in Taiwanese stocks, you would have lost 30 percent in 1995—a year in which most stock markets performed extremely well. Rapidly declining currency values caused many Asian markets to fall by more than 30 percent in 1997; however, more recently most Asian markets have recovered, and they ended 2004 on a positive note. Factors that helped these markets rise included peaceful elections, inflows of foreign capital, economic growth, and the positive expectations for China's economy. During 2004, only Thai and Chinese stocks in the Asian region posted negative returns.

Stocks in emerging markets are intriguing for two reasons. First, developing nations have the greatest potential for growth. Second, while stock returns in developed countries often move in sync with one another, stocks in emerging markets generally march to their own drummers. Therefore, the correlations between U.S. stocks and those in emerging markets are generally lower than between U.S. stocks and those of other developed countries. Thus, correlations suggest that emerging markets improve the diversification of U.S. investors' portfolios. (Recall from Chapter 8 that the lower the correlation, the greater the benefit of diversification.)

On the other hand, stocks in emerging markets are often extremely risky, illiquid, and involve higher transactions costs, and most U.S. investors do not have ready access to information on the companies involved. To reduce these problems, mutual funds focused on specific countries have been created—they are called "country funds." Country funds help investors avoid the problem of picking individual stocks, but they do little to protect you when entire regions decline.

Sources: "World Stock Markets Gamble—and Win," *The Wall Street Journal*, January 3, 2005, p. R6; and Mary Kissel, "Asian Markets Post Gains on Solid Economic Growth: China IPOs May Be '05 Hit," *The Wall Street Journal*, January 3, 2005, p. R6.

Tying It All Together

Corporate decisions should be analyzed in terms of how alternative courses of action are likely to affect a firm's value. However, it is necessary to know how stock prices are established before attempting to measure how a given decision will affect a specific firm's value. This chapter discussed the rights and privileges of common stockholders, showed how stock values are determined, and explained how investors estimate stocks' intrinsic values and expected rates of return.

Two types of stock valuation models were discussed: the discounted dividend model and the corporate valuation model. The dividend model is useful for mature, stable companies, and it is easier to use, but the corporate model is more flexible and better for use with companies that do not pay dividends or whose dividends would be especially hard to predict.

We also discussed preferred stock, which is a hybrid security that has some characteristics of a common stock and some of a bond. Preferreds are valued using models similar to those for perpetual and "regular" bonds.

We also discussed market equilibrium, noting that for a stock to be in equilibrium its price must be equal to its intrinsic value as estimated by a marginal investor, and its expected and required returns as seen by such investors must also be equal. Finally, we noted that stocks are traded worldwide, that U.S. markets account for less than half of the value of all stocks, that U.S. investors can benefit from global diversification, but also that international investing can be risky and for most individuals should be done through mutual funds whose managers have specialized knowledge of foreign markets.

SELF-TEST QUESTIONS AND PROBLEMS
(Solutions Appear in Appendix A)

ST-1   **Key terms** Define each of the following terms:
   a. Proxy; proxy fight; takeover
   b. Preemptive right
   c. Classified stock; founders' shares
   d. Intrinsic value ($\hat{P}_0$); market price (P_0)
   e. Required rate of return, r_s; expected rate of return, $\hat{r}_s$; actual, or realized, rate of return, $\bar{r}_s$
   f. Capital gains yield; dividend yield; expected total return; growth rate, g
   g. Zero growth stock
   h. Normal, or constant, growth; supernormal (nonconstant) growth
   i. Total company (corporate valuation) model
   j. Terminal (horizon) date; horizon (terminal) value
   k. Marginal investor
   l. Equilibrium
   m. Preferred stock

ST-2   **Stock growth rates and valuation** You are considering buying the stocks of two companies that operate in the same industry. They have very similar characteristics except for their dividend payout policies. Both companies are expected to earn $3 per share this year, but Company D (for "dividend") is expected to pay out all of its earnings as dividends, while Company G (for "growth") is expected to pay out only one-third of its earnings, or $1 per share. D's stock price is $25. G and D are equally risky. Which of the following statements is most likely to be true?
   a. Company G will have a faster growth rate than Company D. Therefore, G's stock price should be greater than $25.
   b. Although G's growth rate should exceed D's, D's current dividend exceeds that of G, and this should cause D's price to exceed G's.
   c. A long-term investor in Stock D will get his or her money back faster because D pays out more of its earnings as dividends. Thus, in a sense, D is like a short-term bond, and G is like a long-term bond. Therefore, if economic shifts cause r_d and r_s to increase, and if the expected streams of dividends from D and G remain constant, both Stocks D and G will decline, but D's price should decline further.
   d. D's expected and required rate of return is $\hat{r}_s = r_s = 12\%$. G's expected return will be higher because of its higher expected growth rate.
   e. If we observe that G's price is also $25, the best estimate of G's growth rate is 8 percent.

ST-3 **Constant growth stock valuation** Fletcher Company's current stock price is $36, its last dividend was $2.40, and its required rate of return is 12 percent. If dividends are expected to grow at a constant rate, g, in the future, and if r_s is expected to remain at 12 percent, what is Fletcher's expected stock price 5 years from now?

ST-4 **Nonconstant growth stock valuation** Snyder Computers Inc. is experiencing rapid growth. Earnings and dividends are expected to grow at a rate of 15 percent during the next 2 years, 13 percent the following year, and at a constant rate of 6 percent during Year 4 and thereafter. Its last dividend was $1.15, and its required rate of return is 12 percent.

   a. Calculate the value of the stock today.
   b. Calculate $\hat{P}_1$ and $\hat{P}_2$.
   c. Calculate the dividend and capital gains yields for Years 1, 2, and 3.

QUESTIONS

9-1 It is frequently stated that the one purpose of the preemptive right is to allow individuals to maintain their proportionate share of the ownership and control of a corporation.

   a. How important do you suppose control is for the average stockholder of a firm whose shares are traded on the New York Stock Exchange?
   b. Is the control issue likely to be of more importance to stockholders of publicly owned or closely held (private) firms? Explain.

9-2 Is the following the correct equation for finding the value of a constant growth stock? Explain.

$$\hat{P}_0 = \frac{D_0}{r_s + g}$$

9-3 If you bought a share of common stock, you would probably expect to receive dividends plus an eventual capital gain. Would the distribution between the dividend yield and the capital gain yield be influenced by the firm's decision to pay more dividends rather than to retain and reinvest more of its earnings? Explain.

9-4 Two investors are evaluating GE's stock for possible purchase. They agree on the expected value of D_1 and also on the expected future dividend growth rate. Further, they agree on the riskiness of the stock. However, one investor normally holds stocks for 2 years, while the other holds stocks for 10 years. On the basis of the type of analysis done in this chapter, should they both be willing to pay the same price for GE's stock? Explain.

9-5 A bond that pays interest forever and has no maturity is a perpetual bond. In what respect is a perpetual bond similar to a no-growth common stock? Are there preferred stocks that are evaluated similarly to perpetual bonds and other preferred stocks that are more like bonds with finite lives? Explain.

PROBLEMS

Easy
Problems 1–6

9-1 **DPS calculation** Warr Corporation just paid a dividend of $1.50 a share (that is, $D_0 = $1.50). The dividend is expected to grow 7 percent a year for the next 3 years and then at 5 percent a year thereafter. What is the expected dividend per share for each of the next 5 years?

9-2 **Constant growth valuation** Thomas Brothers is expected to pay a $0.50 per share dividend at the end of the year (that is, $D_1 = $0.50). The dividend is expected to grow at a constant rate of 7 percent a year. The required rate of return on the stock, r_s, is 15 percent. What is the stock's value per share?

9-3 **Constant growth valuation** Harrison Clothiers' stock currently sells for $20 a share. It just paid a dividend of $1.00 a share (that is, $D_0 = $1.00). The dividend is expected to

grow at a constant rate of 6 percent a year. What stock price is expected 1 year from now? What is the required rate of return?

9-4   **Nonconstant growth valuation** Hart Enterprises recently paid a dividend, D_0, of $1.25. It expects to have nonconstant growth of 20 percent for 2 years followed by a constant rate of 5 percent thereafter. The firm's required return is 10 percent.

   a.   How far away is the terminal, or horizon, date?
   b.   What is the firm's horizon, or terminal, value?
   c.   What is the firm's intrinsic value today, $\hat{P}_0$?

9-5   **Corporate value model** Smith Technologies is expected to generate $150 million in free cash flow next year, and FCF is expected to grow at a constant rate of 5 percent per year indefinitely. Smith has no debt or preferred stock, and its WACC is 10 percent. If Smith has 50 million shares of stock outstanding, what is the stock's value per share?

9-6   **Preferred stock valuation** Fee Founders has perpetual preferred stock outstanding that sells for $60 a share and pays a dividend of $5 at the end of each year. What is the required rate of return?

9-7   **Preferred stock rate of return** What will be the nominal rate of return on a perpetual preferred stock with a $100 par value, a stated dividend of 8 percent of par, and a current market price of (a) $60, (b) $80, (c) $100, and (d) $140?

9-8   **Preferred stock valuation** Ezzell Corporation issued perpetual preferred stock with a 10 percent annual dividend. The stock currently yields 8 percent, and its par value is $100.

   a.   What is the stock's value?
   b.   Suppose interest rates rise and pull the preferred stock's yield up to 12 percent. What would be its new market value?

9-9   **Preferred stock returns** Bruner Aeronautics has perpetual preferred stock outstanding with a par value of $100. The stock pays a quarterly dividend of $2, and its current price is $80.

   a.   What is its nominal annual rate of return?
   b.   What is its effective annual rate of return?

9-10   **Valuation of a declining growth stock** Martell Mining Company's ore reserves are being depleted, so its sales are falling. Also, its pit is getting deeper each year, so its costs are rising. As a result, the company's earnings and dividends are declining at the constant rate of 5 percent per year. If $D_0 = \$5$ and $r_s = 15\%$, what is the value of Martell Mining's stock?

9-11   **Valuation of a constant growth stock** A stock is expected to pay a dividend of $0.50 at the end of the year (that is, $D_1 = 0.50$), and it should continue to grow at a constant rate of 7 percent a year. If its required return is 12 percent, what is the stock's expected price 4 years from today?

9-12   **Valuation of a constant growth stock** Investors require a 15 percent rate of return on Levine Company's stock (that is, $r_s = 15\%$).

   a.   What is its value if the previous dividend was $D_0 = \$2$ and investors expect dividends to grow at a constant annual rate of (1) −5 percent, (2) 0 percent, (3) 5 percent, or (4) 10 percent?
   b.   Using data from part a, what would the Gordon (constant growth) model value be if the required rate of return were 15 percent and the expected growth rate were (1) 15 percent or (2) 20 percent? Are these reasonable results? Explain.
   c.   Is it reasonable to think that a constant growth stock could have $g > r_s$?

9-13   **Rates of return and equilibrium** Stock C's beta coefficient is $b_C = 0.4$, while Stock D's is $b_D = -0.5$. (Stock D's beta is negative, indicating that its return rises when returns on most other stocks fall. There are very few negative beta stocks, although collection agency stocks are sometimes cited as an example.)

   a.   If the risk-free rate is 7 percent and the expected rate of return on an average stock is 11 percent, what are the required rates of return on Stocks C and D?
   b.   For Stock C, suppose the current price, P_0, is $25; the next expected dividend, D_1, is $1.50; and the stock's expected constant growth rate is 4 percent. Is the stock in equilibrium? Explain, and describe what would happen if the stock is not in equilibrium.

9-14   **Constant growth** You are considering an investment in Keller Corp's stock, which is expected to pay a dividend of $2 a share at the end of the year ($D_1 = \$2.00$) and has a beta of 0.9. The risk-free rate is 5.6 percent, and the market risk premium is 6 percent. Keller currently sells for $25 a share, and its dividend is expected to grow at some constant

rate g. Assuming the market is in equilibrium, what does the market believe will be the stock price at the end of 3 years? (That is, what is $\hat{P}_3$?)

9-15 **Equilibrium stock price** The risk-free rate of return, r_{RF}, is 6 percent; the required rate of return on the market, r_M, is 10 percent; and Upton Company's stock has a beta coefficient of 1.5.

a. If the dividend expected during the coming year, D_1, is $2.25, and if g = a constant 5 percent, at what price should Upton's stock sell?

b. Now, suppose the Federal Reserve Board increases the money supply, causing the risk-free rate to drop to 5 percent and r_M to fall to 9 percent. What would happen to Upton's price?

c. In addition to the change in part b, suppose investors' risk aversion declines, and this, combined with the decline in r_{RF}, causes r_M to fall to 8 percent. Now, what is Upton's price?

d. Now suppose Upton has a change in management. The new group institutes policies that increase the expected constant growth rate from 5 to 6 percent. Also, the new management smooths out fluctuations in sales and profits, causing beta to decline from 1.5 to 1.3. Assume that r_{RF} and r_M are equal to the values in part c. After all these changes, what is its new equilibrium price? (Note: D_1 is now $2.27.)

9-16 **Nonconstant growth** Microtech Corporation is expanding rapidly and currently needs to retain all of its earnings, hence it does not pay dividends. However, investors expect Microtech to begin paying dividends, beginning with a dividend of $1.00 coming 3 years from today. The dividend should grow rapidly—at a rate of 50 percent per year—during Years 4 and 5, but after Year 5 growth should be a constant 8 percent per year. If the required return on Microtech is 15 percent, what is the value of the stock today?

9-17 **Corporate valuation** Dozier Corporation is a fast-growing supplier of office products. Analysts project the following free cash flows (FCFs) during the next 3 years, after which FCF is expected to grow at a constant 7 percent rate. Dozier's WACC is 13 percent.

Year	0	1	2	3
FCF ($ millions)	NA	−$20	$30	$40

a. What is Dozier's terminal, or horizon, value? (Hint: Find the value of all free cash flows beyond Year 3 discounted back to Year 3.)

b. What is the firm's value today?

c. Suppose Dozier has $100 million of debt and 10 million shares of stock outstanding. What is your estimate of the price per share?

9-18 **Nonconstant growth** Mitts Cosmetics Co.'s stock price is $58.88, and it recently paid a $2 dividend. This dividend is expected to grow by 25 percent for the next 3 years, and then grow forever at a constant rate, g, and r_s = 12%. At what constant rate is the stock expected to grow after Year 3?

9-19 **Constant growth** Your broker offers to sell you some shares of Bahnsen & Co. common stock that paid a dividend of $2 *yesterday*. Bahnsen's dividend is expected to grow at 5 percent per year for the next 3 years, and, if you buy the stock, you plan to hold it for 3 years and then sell it. The appropriate discount rate is 12 percent.

a. Find the expected dividend for each of the next 3 years; that is, calculate D_1, D_2, and D_3. Note that D_0 = $2.00.

b. Given that the first dividend payment will occur 1 year from now, find the present value of the dividend stream; that is, calculate the PV of D_1, D_2, and D_3, and then sum these PVs.

c. You expect the price of the stock 3 years from now to be $34.73; that is, you expect $\hat{P}_3$ to equal $34.73. Discounted at a 12 percent rate, what is the present value of this expected future stock price? In other words, calculate the PV of $34.73.

d. If you plan to buy the stock, hold it for 3 years, and then sell it for $34.73, what is the most you should pay for it today?

e. Use Equation 9-2 to calculate the present value of this stock. Assume that g = 5%, and it is constant.

f. Is the value of this stock dependent upon how long you plan to hold it? In other words, if your planned holding period were 2 years or 5 years rather than 3 years, would this affect the value of the stock today, $\hat{P}_0$? Explain.

9-20 **Nonconstant growth stock valuation** Taussig Technologies Corporation (TTC) has been growing at a rate of 20 percent per year in recent years. This same growth rate is expected to last for another 2 years, then to decline to g_n = 6%.

a. If $D_0 = \$1.60$ and $r_s = 10\%$, what is TTC's stock worth today? What are its expected dividend and capital gains yields at this time, that is, during Year 1?

b. Now assume that TTC's period of supernormal growth is to last for 5 years rather than 2 years. How would this affect the price, dividend yield, and capital gains yield? Answer in words only.

c. What will TTC's dividend and capital gains yields be once its period of supernormal growth ends? (Hint: These values will be the same regardless of whether you examine the case of 2 or 5 years of supernormal growth; the calculations are very easy.)

d. Of what interest to investors is the changing relationship between dividend and capital gains yields over time?

9-21 Corporate value model Barrett Industries invests a lot of money in R&D, and as a result it retains and reinvests all of its earnings. In other words, Barrett does not pay any dividends, and it has no plans to pay dividends in the near future. A major pension fund is interested in purchasing Barrett's stock. The pension fund manager has estimated Barrett's free cash flows for the next 4 years as follows: $3 million, $6 million, $10 million, and $15 million. After the 4th year, free cash flow is projected to grow at a constant 7 percent. Barrett's WACC is 12 percent, its debt and preferred stock total to $60 million, and it has 10 million shares of common stock outstanding.

a. What is the present value of the free cash flows projected during the next 4 years?

b. What is the firm's terminal value?

c. What is the firm's total value today?

d. What is an estimate of Barrett's price per share?

9-22 Corporate value model Assume that today is December 31, 2005, and the following information applies to Vermeil Airlines:

- After-tax operating income [EBIT$(1 - T)$, also called NOPAT] for 2006 is expected to be $500 million.
- The depreciation expense for 2006 is expected to be $100 million.
- The capital expenditures for 2006 are expected to be $200 million.
- No change is expected in net operating working capital.
- The free cash flow is expected to grow at a constant rate of 6 percent per year.
- The required return on equity is 14 percent.
- The WACC is 10 percent.
- The market value of the company's debt is $3 billion.
- 200 million shares of stock are outstanding.

Using the free cash flow approach, what should the company's stock price be today?

9-23 Beta coefficients Suppose Chance Chemical Company's management conducted a study and concluded that if it expands its consumer products division (which is less risky than its primary business, industrial chemicals), its beta would decline from 1.2 to 0.9. However, consumer products have a somewhat lower profit margin, and this would cause its constant growth rate in earnings and dividends to fall from 6 percent to 4 percent. The following also apply: $r_M = 9\%$; $r_{RF} = 6\%$; and $D_0 = \$2.00$.

a. Should management expand the consumer products division?

b. Assume all the facts as given above except the change in the beta coefficient. How low would the beta have to fall to cause the expansion to be a good one? (Hint: Set $\hat{P}_0$ under the new policy equal to $\hat{P}_0$ under the old one, and find the new beta that will produce this equality.)

9-24 Nonconstant growth Assume that it is now January 1, 2006. Wayne-Martin Electric Inc. (WME) has just developed a solar panel capable of generating 200 percent more electricity than any solar panel currently on the market. As a result, WME is expected to experience a 15 percent annual growth rate for the next 5 years. By the end of 5 years, other firms will have developed comparable technology, and WME's growth rate will slow to 5 percent per year indefinitely. Stockholders require a return of 12 percent on WME's stock. The most recent annual dividend (D_0), which was paid yesterday, was $1.75 per share.

a. Calculate WME's expected dividends for 2006, 2007, 2008, 2009, and 2010.

b. Calculate the value of the stock today, $\hat{P}_0$. Proceed by finding the present value of the dividends expected at the end of 2006, 2007, 2008, 2009, and 2010 plus the present value of the stock price that should exist at the end of 2010. The year-end 2010 stock price can be found by using the constant growth equation. Notice that to find the December 31, 2010, price, you must use the dividend expected in 2011, which is 5 percent greater than the 2010 dividend.

c. Calculate the expected dividend yield, D_1/P_0, capital gains yield, and total return (dividend yield plus capital gains yield) expected for 2006. (Assume that $\hat{P}_0 = P_0$, and

recognize that the capital gains yield is equal to the total return minus the dividend yield.) Then calculate these same three yields for 2011.

d. How might an investor's tax situation affect his or her decision to purchase stocks of companies in the early stages of their lives, when they are growing rapidly, versus stocks of older, more mature firms? When does WME's stock become "mature" for purposes of this question?

e. Suppose your boss tells you she believes that WME's annual growth rate will be only 12 percent during the next 5 years and that the firm's long-run growth rate will be only 4 percent. Without doing any calculations, what general effect would these growth-rate changes have on the price of WME's stock?

f. Suppose your boss also tells you that she regards WME as being quite risky and that she believes the required rate of return should be 14 percent, not 12 percent. Without doing any calculations, how would the higher required rate of return affect the price of the stock, the capital gains yield, and the dividend yield? Again, assume that the long-run growth rate is 4 percent.

COMPREHENSIVE/SPREADSHEET PROBLEM

9-25 **Nonconstant growth and corporate valuation** Rework Problem 9-20, parts a, b, and c, using a spreadsheet model. For part b, calculate the price, dividend yield, and capital gains yield as called for in the problem. After completing parts a through c, answer the following additional question using the spreadsheet model.

d. TTC recently introduced a new line of products that has been wildly successful. On the basis of this success and anticipated future success, the following free cash flows were projected:

Year	1	2	3	4	5	6	7	8	9	10
FCF	$5.5	$12.1	$23.8	$44.1	$69.0	$88.8	$107.5	$128.9	$147.1	$161.3

After the 10th year, TTC's financial planners anticipate that its free cash flow will grow at a constant rate of 6 percent. Also, the firm concluded that the new product caused the WACC to fall to 9 percent. The market value of TTC's debt is $1,200 million, it uses no preferred stock, and there are 20 million shares of common stock outstanding. Use the free cash flow method to value the stock.

Integrated Case

Mutual of Chicago Insurance Company

9-26 **Stock valuation** Robert Balik and Carol Kiefer are senior vice presidents of the Mutual of Chicago Insurance Company. They are co-directors of the company's pension fund management division, with Balik having responsibility for fixed income securities (primarily bonds) and Kiefer being responsible for equity investments. A major new client, the California League of Cities, has requested that Mutual of Chicago present an investment seminar to the mayors of the represented cities, and Balik and Kiefer, who will make the actual presentation, have asked you to help them.

To illustrate the common stock valuation process, Balik and Kiefer have asked you to analyze the Bon Temps Company, an employment agency that supplies word-processor operators and computer programmers to businesses with temporarily heavy workloads. You are to answer the following questions:

a. Describe briefly the legal rights and privileges of common stockholders.

b. (1) Write out a formula that can be used to value any stock, regardless of its dividend pattern.

(2) What is a constant growth stock? How are constant growth stocks valued?

(3) What are the implications if a company forecasts a constant g that exceeds its r_s? Will many stocks have expected $g > r_s$ in the short run (that is, for the next few years)? In the long run (that is, forever)?

c. Assume that Bon Temps has a beta coefficient of 1.2, that the risk-free rate (the yield on T-bonds) is 7 percent, and that the required rate of return on the market is 12 percent. What is Bon Temps' required rate of return?

d. Assume that Bon Temps is a constant growth company whose last dividend (D_0, which was paid yesterday) was $2.00 and whose dividend is expected to grow indefinitely at a 6 percent rate.

(1) What is the firm's expected dividend stream over the next 3 years?

(2) What is its current stock price?

(3) What is the stock's expected value 1 year from now?

(4) What are the expected dividend yield, capital gains yield, and total return during the first year?

e. Now assume that the stock is currently selling at $30.29. What is its expected rate of return?

f. What would the stock price be if its dividends were expected to have zero growth?

g. Now assume that Bon Temps is expected to experience nonconstant growth of 30 percent for the next 3 years, then to return to its long-run constant growth rate of 6 percent. What is the stock's value under these conditions? What are its expected dividend and capital gains yields in Year 1? Year 4?

h. Suppose Bon Temps is expected to experience zero growth during the first 3 years and then to resume its steady-state growth of 6 percent in the fourth year. What would its value be then? What would its expected dividend and capital gains yields be in Year 1? In Year 4?

i. Finally, assume that Bon Temps' earnings and dividends are expected to decline at a constant rate of 6 percent per year, that is, $g = -6\%$. Why would anyone be willing to buy such a stock, and at what price should it sell? What would be its dividend and capital gains yields in each year?

j. Suppose Bon Temps embarked on an aggressive expansion that requires additional capital. Management decided to finance the expansion by borrowing $40 million and by halting dividend payments to increase retained earnings. Its WACC is now 10 percent, and the projected free cash flows for the next 3 years are −$5 million, $10 million, and $20 million. After Year 3, free cash flow is projected to grow at a constant 6 percent. What is Bon Temps' total value? If it has 10 million shares of stock and $40 million of total debt, what is the price per share?

k. For Bon Temps' stock to be in equilibrium, what relationship must exist between its estimated intrinsic value and its current stock price and between its expected and required rates of return? Are the equilibrium intrinsic value and expected rate of return the values that management estimates or values as estimated by some other entity? Explain.

l. If equilibrium does not exist, how will it be established?

m. Suppose Bon Temps decided to issue preferred stock that would pay an annual dividend of $5, and the issue price was $50 per share. What would the expected return be on this stock? Would the expected rate of return be the same if the preferred was a perpetual issue or if it had a 20-year maturity?

cyberproblem

Please go to the ThomsonNOW Web site to access the Cyberproblems.

THOMSON ONE | Business School Edition

Access the Thomson ONE problems though the ThomsonNOW Web site. Use the Thomson ONE—Business School Edition online database to work this chapter's questions.

Estimating ExxonMobil's Intrinsic Stock Value

In this chapter we described the various factors that influence stock prices and the approaches that analysts use to estimate a stock's intrinsic value. By comparing these intrinsic value estimates to the current price, an investor can assess whether it makes sense to buy or sell a particular stock. Stocks trading at a price far below their estimated intrinsic values may be good candidates for purchase, whereas stocks trading at prices far in excess of their intrinsic value may be good stocks to avoid or sell.

While estimating a stock's intrinsic value is a complex exercise that requires reliable data and good judgment, we can use the data available in Thomson One to arrive at a quick "back of the envelope" calculation of intrinsic value.

Discussion Questions

1. For purposes of this exercise, let's take a closer look at the stock of ExxonMobil Corporation (XOM). Looking at the COMPANY OVERVIEW we can immediately see the company's current stock price and its performance relative to the overall market in recent months. What is ExxonMobil's current stock price? How has the stock performed relative to the market over the past few months?

2. Click on the "NEWS" tab to see the recent news stories for the company. Have there been any recent events impacting the company's stock price, or have things been relatively quiet?

3. To provide a starting point for gauging a company's relative valuation, analysts often look at a company's price-to-earnings (P/E) ratio. Returning to the COMPANY OVERVIEW page, you can see XOM's current P/E ratio. To put this number in perspective, it is useful to compare this ratio with other companies in the same industry and to take a look at how this ratio has changed over time. If you want to see how XOM's P/E ratio stacks up to its peers, click on the tab labeled PEERS. Click on FINANCIALS on the next row of tabs and then select KEY FINANCIAL RATIOS. Toward the bottom of the table you should see information on the P/E ratio in the section titled Market Value Ratios. Toward the top, you should see an item where it says CLICK HERE TO SELECT NEW PEER SET—do this if you want to compare XOM to a different set of firms. For the most part, is XOM's P/E ratio above or below that of its peers? In Chapter 4, we discussed the various factors that may influence P/E ratios. Off the top of your head, can these factors explain why XOM's P/E ratio differs from its peers?

4. Now to see how XOM's P/E ratio has varied over time—return back to the COMPANY OVERVIEW page. Next click FINANCIALS—GROWTH RATIOS and then select WORLDSCOPE—INCOME STATEMENT RATIOS. Is XOM's current P/E ratio well above or well below its historical average? If so, do you have any explanation for why the current P/E deviates from its historical trend? On the basis of this information, does XOM's current P/E suggest that the stock is undervalued or overvalued? Explain.

5. In the text, we discussed using the dividend growth model to estimate a stock's intrinsic value. To keep things as simple as possible, let's assume at first that XOM's dividend is expected to grow at some constant rate over time. If so, the intrinsic value equals $D_1/(r_s - g)$, where D_1 is the expected annual dividend 1 year from now, r_s is the stock's required rate of return, and g is the dividend's constant growth rate. To estimate the dividend growth rate, it's first helpful to look at XOM's dividend history.

Staying on the current Web page (WORLDSCOPE—INCOME STATEMENT RATIOS) you should immediately find the company's annual dividend over the past several years. On the basis of this information, what has been the average annual dividend growth rate? Another way to get estimates of dividend growth rates is to look at analysts' forecasts for future dividends, which can be found on the ESTIMATES tab. Scrolling down the page you should see an area marked "Consensus Estimates" and a tab under "Available Measures." Here you click on the down arrow key and select Dividends Per Share (DPS). What is the median year-end dividend forecast? You can use this as an estimate of D_1 in your measure of intrinsic value. You can also use this forecast along with the historical data to arrive at a measure of the forecasted dividend growth rate, g.

6. The required return on equity, r_s, is the final input needed to estimate intrinsic value. For our purposes you can either assume a number (say, 8 or 9 percent), or you can use the CAPM to calculate an estimate of the cost of equity using the data available in Thomson One. (For more details take a look at the Thomson One exercise for Chapter 8). Having decided on your best estimates for D_1, r_s, and g, you can calculate XOM's intrinsic value. How does this estimate compare with the current stock price? Does your preliminary analysis suggest that XOM is undervalued or overvalued? Explain.

7. It is often useful to perform a sensitivity analysis, where you show how your estimate of intrinsic value varies according to different estimates of D_1, r_s, and g. To do so, recalculate your intrinsic value estimate for a range of different estimates for each of these key inputs. One convenient way to do this is to set up a simple data table in *Excel*. Refer to the *Excel* tutorial accessed through the ThomsonNOW Web site for instructions on data tables. On the basis of this analysis, what inputs justify the current stock price?

8. On the basis of the dividend history you uncovered in question 5 and your assessment of XOM's future dividend payout policies, do you think it is reasonable to assume that the constant growth model is a good proxy for intrinsic value? If not, how would you use the available data in Thomson One to estimate intrinsic value using the nonconstant growth model?

9. Finally, you can also use the information in Thomson One to value the entire corporation. This approach requires that you estimate XOM's annual free cash flows. Once you estimate the value of the entire corporation, you subtract the value of debt and preferred stock to arrive at an estimate of the company's equity value. Divide this number by the number of shares of common stock outstanding, and you calculate an alternative estimate of the stock's intrinsic value. While this approach may take some more time and involves more judgment concerning forecasts of future free cash flows, you can use the financial statements and growth forecasts in Thomson One as useful starting points. Go to Worldscope's Cash Flow Ratios Report (which you find by clicking on FINANCIALS, FUNDAMENTAL RATIOS, and WORLDSCOPE RATIOS) and you will find an estimate of "free cash flow per share." While this number is useful, Worldscope's definition of free cash flow subtracts out dividends per share; therefore, to make it comparable to the measure in this text, you must add back dividends. To see Worldscope's definition of free cash flow (or any term), click on SEARCH FOR COMPANIES from the left toolbar, and select the ADVANCED SEARCH tab. In the middle of your screen, on the right-hand side, you will see a dialog box with terms. Use the down arrow to scroll through the terms, highlighting the term for which you would like to see a definition. Then, click on the DEFINITION button immediately below the dialog box.