

returns of the overall market. For example, in 2007, the overall market (as measured by the S&P 500 Index) was up slightly (+5.49%). That same year some individual stocks realized huge gains while others declined sharply. On the plus side, Research in Motion was up 166%, Amazon.com rose 135%, and Apple Computer climbed 133%. On the down side, E*Trade Financial plummeted 84%; Circuit City, 78%; and Starbucks, 42%. This wide range in individual stocks' returns 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 whether a stock is fairly priced, you first need to estimate the stock's true value, or “intrinsic value,” a concept first discussed in Chapter 1. With this objective in mind, in this chapter, we describe some models that analysts have used to estimate intrinsic values. As you will see, while it is difficult to predict stock prices, we are not completely in the dark. Indeed, 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 market's often-treacherous ups and downs.

Sources: Allan Sloan, “The Incredible Shrinking Bull,” *Fortune*, March 17, 2008, p. 24 and Alexandra Twin, “Best and Worst Stocks of 2007,” CNNMoney.com, December 31, 2007.

PUTTING THINGS IN PERSPECTIVE



Key trends in the securities industry are listed and explained at www.sifma.org/research/statistics/key_industry_trends.html.

In Chapter 7, we examined bonds. We now turn to stocks, both common and preferred. Since the cash flows provided by bonds are set by contract, it is generally easy to predict their cash flows. Preferred stock returns are also set by contract, which makes them similar to bonds; and they are valued in much the same way. However, common stock returns are not contractual—they depend on the firm's earnings, which in turn depend on many random factors, making their valuation more difficult. Two fairly straightforward models are used to estimate stocks' intrinsic (or “true”) values: (1) the discounted dividend model and (2) the corporate valuation model. A stock should, of course, be bought if its price is less than its estimated intrinsic value and sold if its price exceeds its intrinsic value. By the time you finish this chapter, you should be able to:

- Discuss the legal rights of stockholders.
- Explain the distinction between a stock's price and its intrinsic value.
- Identify the two models that can be used to estimate a stock's intrinsic value: the discounted dividend model and the corporate model.
- List the key characteristics of preferred stock and explain how to estimate the value of preferred stock.

Stock valuation is interesting in its own right; but you also need to understand valuation when you estimate the cost of capital for use in capital budgeting, which is probably a firm's most important task.

9-1 LEGAL RIGHTS AND PRIVILEGES OF COMMON STOCKHOLDERS

A corporation's common stockholders are the owners of the corporation; and as such, they have certain rights and privileges, as discussed in this section.

9-1a 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, usually the major stockholder 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. 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 receives them. However, if earnings are poor and stockholders are dissatisfied, an outside group may solicit the 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 in past years include KKR's acquisition of RJR Nabisco, Chevron's acquisition of Gulf Oil, and the QVC/Viacom fight to take over Paramount. More recently, in February 2008, Microsoft made an unsolicited offer for Yahoo; but thus far Yahoo's management has resisted.

Managers without more than 50% 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% of the stockholders (rather than 50%) 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 helps ward off hostile takeover attempts. Managers seeking such changes generally cite a fear that the firm will be picked up at a bargain price, but it often appears that the managers' concern about their own positions is the primary consideration.

Managers' 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 increase outside (non-management) directors' ability to force managers to be more responsive to stockholder complaints.

Proxy

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

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 its 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.

¹In 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.

Managers' pay is another contentious issue. It has been asserted, with considerable support, that CEOs tend to pick other CEOs to serve on their boards, with "you-scratch-my-back-and-I'll-scratch-yours" behavior resulting in excessive compensation packages to top managers. Boards have tried to conceal the facts by making it extremely difficult for stockholders to know what the top managers are being paid. Investors are galled to see CEOs such as Stan O'Neil of Merrill Lynch, who was fired because of his firm's multibillion-dollar loss, walk away with stock and cash worth hundreds of millions. CalPERS and other institutional investors have weighed in on this issue, and most firms today have been forced to make their compensation packages more transparent.

For many years, SEC rules prohibited large investors such as CalPERS from getting together to force corporate managers to institute policy changes. However, the SEC began changing its rules in 1993, and now large investors can work together to force management changes. These rulings have helped keep managers focused on stockholder concerns, which means the maximization of stock prices.

9-1b The Preemptive Right

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).

Common stockholders often have the right, called the **preemptive right**, to purchase on a pro rata basis any additional shares sold by the firm. In some states, the preemptive right is automatically included in every corporate charter; in other states, 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 those shares itself. Management could use this tactic to 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 from 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 firm's total market value to \$150,000. When the new total market value is divided by the 2,000 total shares now 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 a firm's price and transfer wealth from its 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 or Class B to meet special needs of the company.

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 forth. Small, new companies seeking funds from outside sources frequently use different types of common stock. For example, when Google went public, it sold Class A stock to the public while its Class B stock was retained by the company's insiders.

The key difference is that the Class B stock has 10 votes per share while the Class A stock has 1 vote per share. Google's Class B shares are predominantly held by the company's two founders and its current CEO. The use of classified stock thus enables the company's founders to maintain control over the company without having to own a majority of the common stock. For this reason, Class B stock of this type is sometimes called **founders' shares**. Since *dual-class* share structures of this type give special voting privileges to key insiders, these structures are sometimes criticized because they may enable insiders to make decisions that are counter to the interests of the majority of stockholders.

Note that "Class A," "Class B," and so forth, 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 those 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's 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.

Founders' Shares

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

SELF TEST



What are some reasons a company might use classified stock?

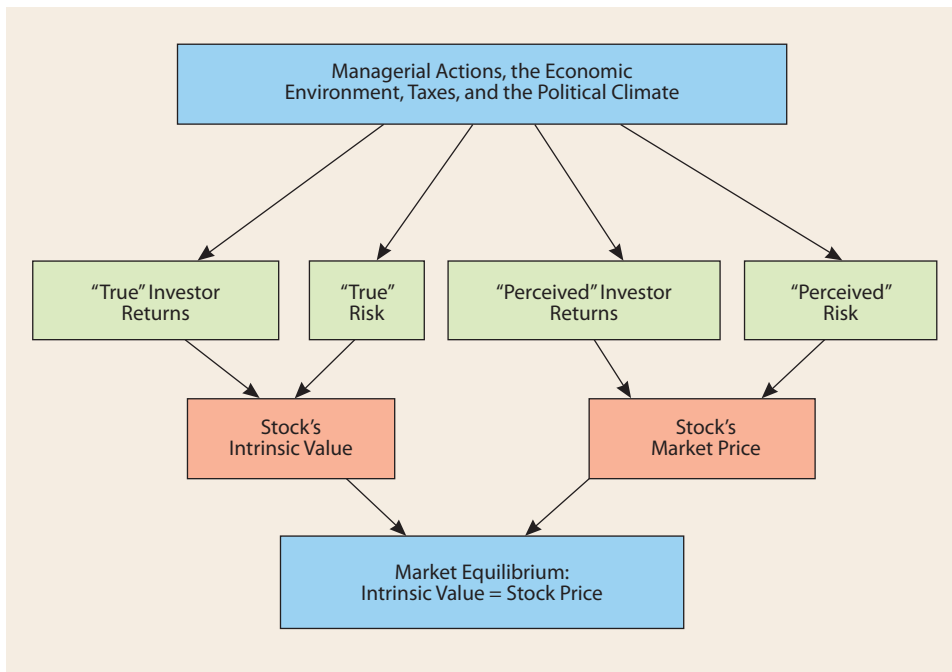
9-3 STOCK PRICE VS. INTRINSIC VALUE

We saw in Chapter 1 that a manager should seek to maximize the value of his or her firm's stock. In that chapter, we also emphasized the difference between stock price and intrinsic value. The stock price is simply the current market price, and it is easily observed for publicly traded companies. By contrast, intrinsic value, which represents the "true" value of the company's stock, cannot be directly observed and must instead be estimated. Figure 9-1 illustrates once again the connection between stock price and intrinsic value.

As the figure suggests, market equilibrium occurs when the stock's price equals its intrinsic value. If the stock market is reasonably efficient, gaps between the stock price and intrinsic value should not be very large and they should not persist for very long. However, in some cases, an individual stock price may be much higher or lower than its intrinsic value. During several years leading up to the credit crunch of 2007–2008, most of the large investment banks were reporting record profits and selling at record prices. However, much of those earnings were illusory in that they did not reflect the huge risks that existed in the mortgage-backed securities they were buying. So with hindsight, we now know that the market prices of most financial firms' stocks exceeded their intrinsic values just prior to 2007. Then when the market realized what was happening, those stock prices crashed. Citigroup, Merrill Lynch, and others lost over 60% of their value in a few short months; and Bear Stearns, the fifth largest investment bank, saw its

FIGURE 9-1

Determinants of Intrinsic Values and Stock Prices



stock price drop from \$171 in 2007 to \$2 in mid-March 2008. It clearly pays to question market prices at times!

9-3a Why Do Investors and Companies Care About Intrinsic Value?

The remainder of this chapter focuses primarily on different approaches for estimating a stock's intrinsic value. Before these approaches are described, it is worth asking why it is important for investors and companies to understand how to calculate intrinsic value.

When investing in common stocks, one's goal is to purchase stocks that are undervalued (i.e., the price is below the stock's intrinsic value) and avoid stocks that are overvalued. Consequently, Wall Street analysts, institutional investors who control mutual funds and pension funds, and many individual investors are interested in finding reliable models that help predict intrinsic value.

Investors obviously care about intrinsic value, but managers also need to understand how intrinsic value is estimated. First, managers need to know how alternative actions are likely to affect stock prices; and the models of intrinsic value that we cover help demonstrate the connection between managerial decisions and firm value. Second, managers should consider whether their stock is significantly undervalued or overvalued before making certain decisions. For example, firms should consider carefully the decision to issue new shares if they believe their stock is undervalued; and an estimate of their stock's intrinsic value is the key to such decisions.

Two basic models are used to estimate intrinsic values: the *discounted dividend model* and the *corporate valuation model*. The dividend model focuses on dividends, while the corporate model goes beyond dividends and focuses on sales, costs, and free cash flows. In the following sections, we describe these approaches in more detail.

SELF TEST



What is the difference between a stock's price and its intrinsic value?

Why do investors and managers need to understand how to estimate a firm's intrinsic value?

What are two commonly used approaches for estimating a stock's intrinsic value?

9-4 THE DISCOUNTED DIVIDEND MODEL

The value of a share of common stock depends on the cash flows it is expected to provide, and those flows consist of two elements: (1) the dividends the investor receives each year while he or she holds the stock and (2) the price received when the stock is sold. The final price includes the original price paid plus an expected capital gain. Keep in mind that there are many different investors in the market and thus many different sets of expectations. Therefore, different investors will have different opinions about a stock's true intrinsic value and thus proper price. The analysis as performed by the **marginal investor**, whose actions actually determine the equilibrium stock price, is critical; but every investor, marginal or not, implicitly goes through the same type of analysis.

The following terms are used in our analysis:²

Marginal investor = the investor (or group of investors with similar views) who is at the margin and would be willing to buy if the stock price was slightly lower or to sell if the price was slightly higher. It is this investor's expectations about dividends, growth, and risk that are key in the valuation process.

Other investors = all except the marginal investor. Some will be more optimistic than the marginal investor; others, more pessimistic. These investors will place new buy or sell orders if events occur to cause them to change their current expectations.

D_t = the dividend a stockholder expects to receive at the end of each Year t . D_0 is the last dividend the company paid. Since it has already been paid, a buyer of the stock will not receive D_0 . The first dividend a new buyer will receive is D_1 , which is paid at the end of Year 1. D_2 is the dividend expected at the end of Year 2; D_3 , at the end of Year 3; and so forth. D_0 is known with certainty; but D_1 , D_2 , and all other future dividends are *expected values*; and different investors can have different expectations.³ Our primary concern is with D_t as forecasted by the *marginal investor*.

P_0 = actual **market price** of the stock today. P_0 is known with certainty, but predicted future prices are subject to uncertainty.

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.

Market Price, P_0

The price at which a stock sells in the market.

²Many terms are described here, and students sometimes get concerned about having to memorize all of them. We tell our students that we will provide formula sheets for use on exams, so they don't have to try to memorize everything. With their minds thus eased, they end up learning what the terms are rather than memorizing them.

³Stocks generally pay dividends quarterly, so theoretically we should evaluate them on a quarterly basis. However, most analysts actually work with annual data because forecasted stock data are not precise enough to warrant the use of 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 Costs in Rate Regulation," *Financial Management*, Autumn 1984, pp. 15–21.

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.

$\hat{P}_t$ = both the expected price and the expected intrinsic value of the stock at the end of each Year t (pronounced “P hat t”) as seen by the investor doing the analysis. $\hat{P}_t$ is based on the investor’s estimates of the dividend stream and the riskiness of that stream. There are many investors in the market, so there can be many estimates for $\hat{P}_t$. However, for the marginal investor, P_0 must equal $\hat{P}_0$. Otherwise, a disequilibrium would exist, and buying and selling in the market would soon result in P_0 equaling $\hat{P}_0$ as seen by the marginal investor.

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

r_s = **required**, or minimum acceptable, **rate of return** on the stock considering its riskiness and the returns available on other investments. Different investors typically have different opinions, but the key is again the marginal investor. The determinants of r_s include factors discussed in Chapter 8, including the real rate of return, expected inflation, and risk.

$\hat{r}_s$ = **expected rate of return** (pronounced “r hat s”) that an investor believes the stock will provide in the future. The expected return can be above or below the required return; but a rational investor will buy the stock if $\hat{r}_s$ exceeds r_s , sell the stock if $\hat{r}_s$ is less than r_s , and simply hold the stock if these returns are equal. Again, the key is the marginal investor, whose views determine the actual stock price.

$\bar{r}_s$ = **actual**, or **realized**, **after-the-fact rate of return**, pronounced “r bar s.” You can *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 with an actual realized return that is much lower, perhaps even negative.

D_1/P_0 = **dividend yield** expected during the coming year. If Company X’s stock is expected to pay a dividend of $D_1 = \$1$ during the next 12 months and if X’s current price is $P_0 = \$20$, the expected dividend yield will be $\$1/\$20 = 0.05 = 5\%$. Different investors could have different expectations for D_1 ; but again, the marginal investor is the key.

$(\hat{P}_1 - P_0)/P_0$ = expected **capital gains yield** on the stock during the coming year. If the stock sells for $\$20.00$ today and if it is expected to rise to $\$21.00$ by the end of the year, the expected capital gain will be $\hat{P}_1 - P_0 = \$21.00 - \$20.00 = \$1.00$ and the expected capital gains yield will be $\$1.00/\$20.00 = 0.05 = 5\%$. Different investors can have different expectations for $\hat{P}_1$, but the marginal investor is key.

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** = $\hat{r}_s = 5\% + 5\% = 10\%$.

All active investors hope to be better than average—they hope to identify stocks whose intrinsic values exceed their current prices and whose expected returns (expected by this investor) exceed the required rate of return. Note, though, that about half of all investors are likely to be disappointed. A good understanding of the points made in this chapter can help you avoid being disappointed.

9-4a Expected Dividends as the Basis for Stock Values

In our discussion of bonds, we used Equation 7-1 to find the value of a bond; the equation is the present value of interest payments over the bond's life plus the present value of its 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 one for bonds. What are the cash flows that a corporation will provide to its stockholders? To answer that question, think of yourself as an investor who buys the stock of a company that is expected to go on indefinitely (for example, GE). You intend to hold it (in your family) forever. In this case, all you (and your heirs) will receive is a stream of dividends; and the value of the stock today can be calculated as the present value of an infinite stream of dividends:

$$\begin{aligned} \text{Value of stock} = \hat{P}_0 &= \text{PV of expected future dividends} \\ &= \frac{D_1}{(1+r_s)^1} + \frac{D_2}{(1+r_s)^2} + \cdots + \frac{D_\infty}{(1+r_s)^\infty} \\ &= \sum_{t=1}^{\infty} \frac{D_t}{(1+r_s)^t} \end{aligned}$$

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 disappears, *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 to the current investor depends on the dividends some future investor expects, and that investor's expected sale price is also dependent on some future dividends, and so forth. 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 stock must be established as the present value of the stock's expected dividend stream.⁴

⁴ The general validity of Equation 9-1 can also be confirmed by asking yourself the following question: Suppose I buy a stock and expect to hold it for 1 year. I will receive dividends during the year plus the value $\hat{P}_1$ when I sell it 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.

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 buy the stock anyway, 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 believe 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 2000, just before the stock market crashed.

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 $P_0 = \$40.00$, what are the stock's expected dividend yield, capital gains yield, and total expected return for the coming year? (**5%, 6%, 11%**)

Is it necessary for all investors to have the same expectations regarding a stock for the stock to be in equilibrium? (**No, but explain.**) What would happen to a stock's price if the "marginal investor" examined a stock and concluded that its intrinsic value was greater than its current market price? (**P_0 would rise.**)

9-5 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, or fluctuating randomly; or it can be zero for several years. Equation 9-1 can be applied in any of these situations; and with a computer spreadsheet, we can easily use the equation to find a stock's intrinsic value—provided we have an estimate of the future dividends. However, it is not easy to obtain accurate estimates of future dividends.

Still, for many companies it is reasonable to predict that dividends will grow at a constant rate. In this case, Equation 9-1 may be rewritten as follows:

9-2

$$\begin{aligned}\hat{P}_0 &= \frac{D_0(1+g)^1}{(1+r_s)^1} + \frac{D_0(1+g)^2}{(1+r_s)^2} + \cdots + \frac{D_0(1+g)^\infty}{(1+r_s)^\infty} \\ &= \frac{D_0(1+g)}{r_s - g} = \frac{D_1}{r_s - g}\end{aligned}$$

Constant Growth (Gordon) Model

Used to find the value of a constant growth stock.

The last term of Equation 9-2 is the **constant growth model**, or **Gordon model**, named after Myron J. Gordon, who did much to develop and popularize it.⁵

The term r_s in Equation 9-2 is the *required rate of return*, which is a riskless rate plus a risk premium. However, we know that if the stock is in equilibrium, the required rate of return must equal the expected rate of return, which is the expected dividend yield plus an expected capital gains yield. So we can solve Equation 9-2 for r_s , but now using the hat to indicate that we are dealing with an expected rate of return:⁶

9-3

$$\begin{array}{rcll}\text{Expected rate} & = & \text{Expected} & + \text{Expected growth rate, or} \\ \text{of return} & & \text{dividend yield} & \text{capital gains yield} \\ \hat{r}_s & = & \frac{D_1}{P_0} & + g\end{array}$$

We illustrate Equations 9-2 and 9-3 in the following section.

⁵The 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*, 9th ed. (Mason, OH: Thomson/South-Western, 2007). In essence, Equation 9-2 is the sum of a geometric progression, and the final result is the solution value of the progression.

⁶The r_s value in Equation 9-2 is a *required* rate of return; but when we transform Equation 9-2 to obtain Equation 9-3, we are finding an *expected* rate of return. Obviously, the transformation requires that $r_s = \hat{r}_s$. This equality must hold if the stock is in equilibrium, as most normally are.

9-5a Illustration of a Constant Growth Stock

Table 9-1 presents an analysis of Allied Food Products' stock as performed by a security analyst after a meeting for analysts and other investors presided over by Allied's CFO. The table looks complicated, but it is really quite straightforward.⁷ Part I, in the upper left corner, provides some basic data. The last dividend, which was just paid, was \$1.15; the stock's last closing price was \$23.06; and it is in equilibrium. Based on an analysis of Allied's history and likely future, the analyst forecasts that earnings and dividends will grow at a constant rate of 8.3% per year and that the stock's price will grow at this same rate. Moreover, the analyst believes that the most appropriate required rate of return is 13.7%. Different analysts might use different inputs; but we assume for now that since this analyst is widely followed, her results represent those of the marginal investor.

Now look at Part IV, where we show the predicted stream of dividends and stock prices along with annual values for the dividend yield, the capital gains yield, and the expected total return. Notice that the total return shown in Column 6 is equal to the required rate of return shown in Part I. This indicates that the stock

Table 9-1
Analysis of a Constant Growth Stock

	A	B	C	D	E	F	G	H	I
1									
2									
3	I. Basic Information			II. Formulas Used in the Analysis:					
4	D_0	=	\$1.15	Dividend in Year t , D_t , in Col. 2					$D_{t-1}(1 + g)$
5	P_0	=	\$23.06	Intrinsic value (and price) in Year t , P_t , in Col. 3					$D_{t+1}/(r_s - g)$
6	g	=	8.30%	Dividend yield (constant), in Col. 4					D_t/P_{t-1}
7	r_s	=	13.70%	Capital gains yield (constant), in Col. 5					$(P_t - P_{t-1})/P_{t-1}$
8						Total return (constant), in Col. 6		Div. yield + CG yield	
9						PV of dividends, discounted at 13.7% Col. 7		$D_t/(1 + r_s)_t$	
10	III. Examples:								
11		Col. 2	$D_1 = \$1.1500(1.083)$					\$1.25	
12		Col. 3	$P_0 = \$1.25/(0.137 - 0.083)$					\$23.06	
13		Col. 4	Dividend yield, Year 1: $\$1.25/\23.06					5.40%	
14		Col. 5	Cap gains yield, Year 1: $(\$24.98 - \$23.06)/\$23.06$					8.30%	
15		Col. 6	Total return, Year 1: $5.4\% + 8.3\%$					13.70%	
16		Col. 7	PV of D_1 discounted at 13.7%					\$1.10	
17									
18	IV. Table: Forecasted Results over Time								
19		At end							PV of
20		of year:	Dividend	Price	Dividend	Capital	Total		dividend
21		(1)	(2)	(3)	yield	gain yield	returns		at 13.7%
22		2008	\$1.15	\$23.06					
23		2009	1.25	24.98	5.40%	8.30%	13.70%		\$1.10
24		2010	1.35	27.05	5.40	8.30	13.70		1.04
25		2011	1.46	29.30	5.40	8.30	13.70		0.99
26		2012	1.58	31.73	5.40	8.30	13.70		0.95
27		2013	1.71	34.36	5.40	8.30	13.70		0.90
28		2014	1.86	37.21	5.40	8.30	13.70		0.86
29		2015	2.01	40.30	5.40	8.30	13.70		0.82
30		2016	2.18	43.65	5.40	8.30	13.70		0.78
31		2017	2.36	47.27	5.40	8.30	13.70		0.74
32		2018	2.55	51.19	5.40	8.30	13.70		0.71
33		↓							↓
34		∞					Sum of PVs from 1 to ∞ = $P_0 =$ \$23.06		

⁷You may notice some minor "errors" in the table. These are not errors—they are simply differences caused by rounding.

analyst thinks that the stock is fairly priced; hence, it is in equilibrium. She forecasted out 10 years, but she could have forecasted out to infinity.

Part II shows the formulas used to calculate the data in Part IV, and Part III gives examples of the calculations. For example, D_1 , the first dividend a purchaser would receive, is forecasted to be $D_1 = \$1.15(1.083) = \1.25 , and the other forecasted dividends in Column 2 were calculated similarly.

The estimated intrinsic values shown in Column 3 are based on Equation 9-2, the constant growth model: $P_0 = D_1/(r_s - g) = \$1.25/(0.137 - 0.083) = \23.06 (corrected for rounding), $P_1 = \$24.98$, and so forth.

Column 4 shows the dividend yield, which for 2009 is $D_1/P_0 = 5.40\%$; and this number is constant thereafter. The capital gain expected during 2009 is $P_1 - P_0 = \$24.98 - \$23.06 = \$1.92$, which when divided by P_0 gives the expected capital gains yield, $\$1.92/\$23.06 = 8.3\%$, again corrected for rounding. The total return is found as the dividend yield plus the capital gains yield, 13.7% ; and it is both constant and equal to the required rate of return given in Part I.

Finally, look at Column 7 in the table. Here we find the present value of each of the dividends shown in Column 2, discounted at the required rate of return. For example, the PV of $D_1 = \$1.25/(1.137)^1 = \1.10 , the PV of $D_2 = \$1.35/(1.137)^2 = \1.04 , and so forth. If you extended the table out to about 170 years (with Excel, this is easy), then summed the PVs of the dividends, you would get the same value as that found using Equation 9-2, $\$23.06$.⁸ Figure 9-2 shows graphically what's happening. We extended the table out 20 years and then plotted dividends from Column 2 in the upper step function curve and the PV of those dividends in the lower curve. The sum of the PVs is an estimate of the stock's forecasted intrinsic value.

Note that in Table 9-1, the forecasted intrinsic value is equal to the current stock price and the expected total return is equal to the required rate of return. In this situation, the analysis would call the stock a "Hold" and would recommend that investors not buy or sell it. However, if the analyst were somewhat more optimistic and thought the growth rate would be 10.0% rather than 8.3% , the forecasted intrinsic value would be (by Equation 9-2) $\$34.19$ and the analyst would call it a "Buy." At $g = 6\%$, the intrinsic value would be $\$15.83$ and the stock would be a "Sell." Changes in the required rate of return would produce similar changes in the forecasted intrinsic value and thus the equilibrium current price.

9-5b Dividends Versus Growth

The discounted dividend model as expressed in Equation 9-2 shows that, other things held constant, a higher value for D_1 increases a stock's price. However, Equation 9-2 shows that a higher growth rate also increases the stock's price. But now recognize the following:

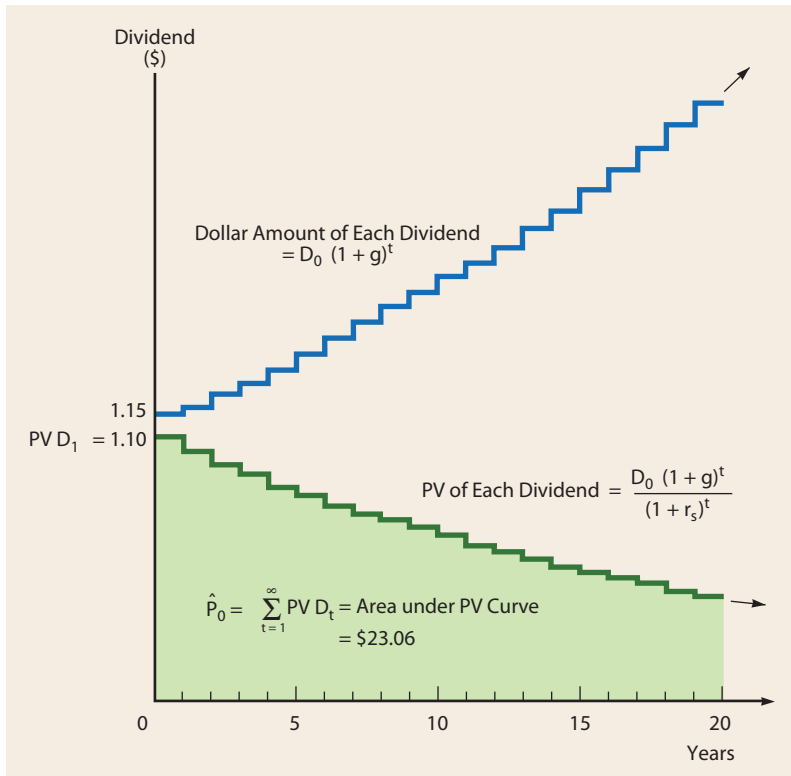
- Dividends are paid out of earnings.
- Therefore, growth in dividends requires growth in earnings.
- Earnings growth in the long run occurs primarily because firms retain earnings and reinvest them in the business.
- Therefore, the higher the percentage of earnings retained, the higher the growth rate.

To illustrate all this, suppose you inherit a business that has $\$1,000,000$ of assets, no debt, and thus $\$1,000,000$ of equity. The expected return on equity (ROE)

⁸The dividends get quite large, but the discount rate exceeds the growth rate; so the PVs of the dividends become quite small. In theory, you would have to go out to infinity to find the exact price of a constant growth stock, but the difference between the Equation 9-2 value and the sum of the PVs can't be seen out to 2 decimal places if you go out about 170 periods.

FIGURE 9-2

Present Values of Dividends of a Constant Growth Stock where
 $D_0 = \$1.15$, $g = 8.3\%$, $r_s = 13.7\%$



equals 10.0%, so its expected earnings for the coming year are $(0.10)\$1,000,000 = \$100,000$. You could take out the entire \$100,000 of earnings in dividends, or you could reinvest some or all of the \$100,000 in the business. If you pay out all the earnings, you will have \$100,000 of dividend income this year, but dividends will not grow because assets and therefore earnings will not grow.

However, suppose you decide to have the firm pay out 40% and retain 60%. Now your dividend income in Year 1 will be \$40,000; but assets will rise by \$60,000, and earnings and dividends will likewise increase:

$$\begin{aligned}\text{Next year's earnings} &= \text{Prior earnings} + \text{ROE}(\text{Retained earnings}) \\ &= \$100,000 + 0.1(\$60,000) \\ &= \$106,000\end{aligned}$$

$$\text{Next year's dividends} = 0.4(\$106,000) = \$42,400$$

Moreover, your dividend income will continue to grow by 6% per year thereafter:

$$\begin{aligned}\text{Growth rate} &= (1 - \text{Payout ratio})\text{ROE} \\ &= (1 - 0.4)10.0\% \\ &= 0.6(10.0\%) = 6\%\end{aligned}$$

9-4

This demonstrates that in the long run, growth in dividends depends primarily on the firm's payout ratio and its ROE.

In our example, we assumed that other things remain constant. This is often but not always a logical assumption. For example, suppose the firm develops a

successful new product or hires a better CEO or makes some other change that increased the ROE. Any of these actions could cause the ROE and thus the growth rate to increase. Also note that the earnings of new firms are often low or even negative for several years, then begin to rise rapidly; finally, growth levels off as the firm approaches maturity. Such a firm might pay no dividends for its first few years, then pay a low initial dividend but let it increase rapidly, and finally make regular payments that grow at a constant rate once earnings have stabilized. In any such situation, the nonconstant model as discussed in a later section must be used.

9-5c Which Is Better: Current Dividends or Growth?

We saw in the preceding section that a firm can pay a higher current dividend by increasing its payout ratio, but that will lower its dividend growth rate. So the firm can provide a relatively high current dividend or a high growth rate but not both. This being the case, which would stockholders prefer? The answer is not clear. As we will see in the dividend chapter, some stockholders prefer current dividends while others prefer a lower payout ratio and future growth. Empirical studies have been unable to determine which strategy is optimal in the sense of maximizing a firm's stock price. So dividend policy is an issue that management must decide on the basis of its judgment, not a mathematical formula. Logically, shareholders should prefer for the company to retain more earnings (hence pay less current dividends) if the firm has exceptionally good investment opportunities; however, shareholders should prefer a high payout if investment opportunities are poor. In spite of this, taxes and other factors complicate the situation. We will discuss all this in detail in the dividend chapter; but for now, just assume that the firm's management has decided on a payout policy and uses that policy to determine the actual dividend.

9-5d Required Conditions for the Constant Growth Model

Several conditions are necessary for Equation 9-2 to be used. First, the required rate of return, r_s , must be greater than the long-run growth rate, g . *If the equation is used in situations where g is greater than r_s , the results will be wrong, meaningless, and misleading.* For example, if the forecasted growth rate in our example was 15% and thus exceeded the 13.7% required rate of return, stock price as calculated by Equation 9-2 would be a *negative* \$101.73. That would be nonsense—stocks can't have negative prices. Moreover, in Table 9-1, the PV of each future dividend would exceed that of the prior year. If this situation was graphed in Figure 9-2, the step-function curve for the PV of dividends would be increasing, not decreasing; so the sum would be infinitely high, which would indicate an infinitely high stock price. Obviously, stock prices cannot be either infinite or negative, so Equation 9-2 cannot be used unless $r_s > g$.

Second, the constant growth model as expressed in Equation 9-2 is not appropriate unless a company's growth rate is expected to remain constant in the future. This condition almost never holds for new start-up firms, but it does exist for many mature companies. Indeed, mature firms such as Allied and GE are generally expected to grow at about the same rate as nominal gross domestic product (that is, 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% a year.

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 9-5:

9-5

$$\hat{P}_0 = \frac{D}{r_s}$$

Zero Growth Stock

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

This is the same equation as the one we developed in Chapter 5 for a perpetuity, and it is simply the current dividend divided by the discount rate.

Finally, as we discuss later in the chapter, most firms, even rapidly growing startups and others that pay no dividends at present, can be expected to pay dividends at some point in the future, at which time the constant growth model will be appropriate. For such firms, Equation 9-2 is used as one part of a more complicated valuation equation that we discuss next.

SELF TEST



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

Explain how the formula for a zero growth stock can be derived from that for a normal constant growth stock.

Firm A is expected to pay a dividend of \$1.00 at the end of the year. The required rate of return is $r_s = 11\%$. Other things held constant, what would the stock's price be if the growth rate was 5%? What if g was 0%? (**\$16.67; \$9.09**)

Firm B has a 12% ROE. Other things held constant, what would its expected growth rate be if it paid out 25% of its earnings as dividends? 75%? (**9%, 3%**)

If Firm B had a 75% payout ratio but then lowered it to 25%, causing its growth rate to rise from 3% to 9%, would that action necessarily increase the price of its stock? Why or why not?

9-6 VALUING NONCONSTANT GROWTH STOCKS

For many companies, it is not appropriate to assume that dividends will grow at a constant rate. Indeed, most firms go through *life cycles* where they experience different growth rates during different parts of the cycle. In their early years, most firms 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.⁹ Automobile manufacturers in the 1920s, computer software firms such as Microsoft in the 1990s, and Google in the 2000s are examples of firms in the early part of their cycle. These firms are defined as **supernormal**, or **nonconstant growth**, firms. Figure 9-3 illustrates nonconstant growth and compares it with normal growth, zero growth, and negative growth.¹⁰

In the figure, the dividends of the supernormal growth firm are expected to grow at a 30% rate for three years, after which the growth rate is expected to fall to 8%, 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

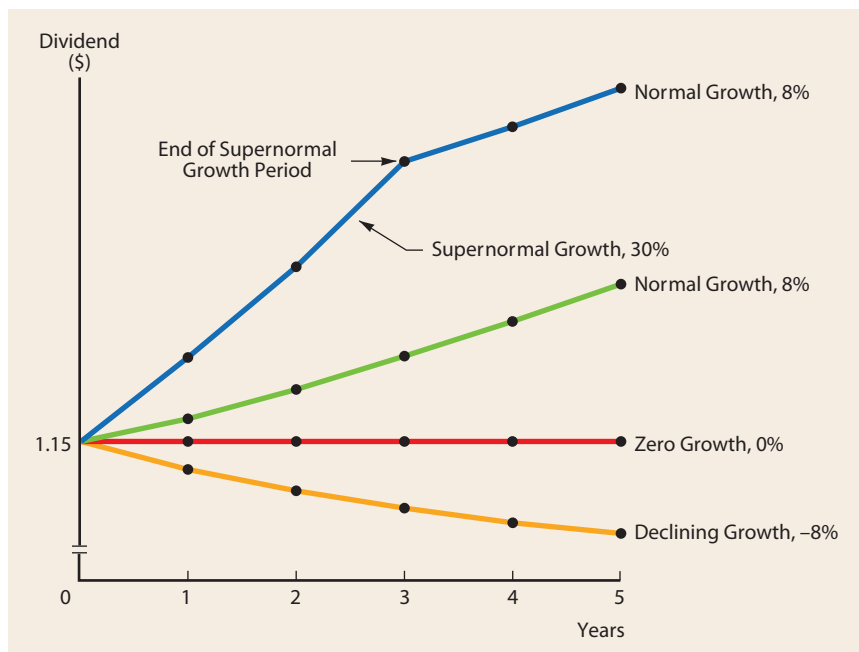
Supernormal (Nonconstant) Growth
The part of the firm's life cycle in which it grows much faster than the economy as a whole.

⁹ The concept of life cycles could be broadened to *product cycle*, which would include both small start-up companies and large companies such as 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 use in the discounted dividend model.

¹⁰ 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, which would lead to capital losses rather than capital gains. Obviously, a declining company's stock price is 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 is still a good investment that would provide a good return.

FIGURE 9-3

Illustrative Dividend Growth Rates



Equation 9-1. When D_t is growing at a constant rate, we can simplify Equation 9-1 to Equation 9-2, $\hat{P}_0 = D_1/(r_s - g)$. In the supernormal case, however, the expected growth rate is not a constant. In our example, there are two distinctly different rates.

Because Equation 9-2 requires a constant growth rate, we obviously cannot use it to value stocks that are not growing at a constant rate. 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 construct a new formula, Equation 9-6, for valuing the stock.

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**, 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:

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

Terminal (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.

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

9-6

To implement Equation 9-6, 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 stock price 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 stock's intrinsic value, $\hat{P}_0$.

Figure 9-4 illustrates the process for valuing nonconstant growth stocks. Here we use a new company, Firm M, and we assume that 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% for three years, 20% for the next three years, and a constant 8% thereafter).

g_n = rate of normal, constant growth after the nonconstant period = 8.0%. This rate is also shown on the time line, after Period 3, when it is in effect.

D_0 = last dividend the company paid = \$1.15.

The valuation process diagrammed in Figure 9-4 is explained in the steps set forth below the time line. The value of the nonconstant growth stock is calculated to be \$39.21.

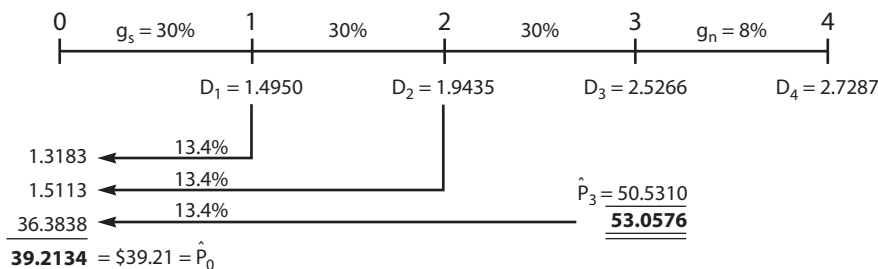
Note that in this example, we assumed a relatively short 3-year horizon to keep things simple. When evaluating stocks, most analysts use a longer horizon (for example, 5 years) to estimate intrinsic values. This requires a few more calculations; but because analysts use spreadsheets, the arithmetic is not a problem. In practice, the real limitation is obtaining reliable forecasts for future growth.

SELF TEST



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

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

FIGURE 9-4**Finding the Value of a Nonconstant Growth Stock**

Notes to Figure 9-4:

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 3-year nonconstant growth period, 30%. Show the \$1.4950 on the time line as the cash flow at Time 1. Calculate $D_2 = D_1(1 + g_s) = \$1.4950(1.30) = \1.9435 , 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 Times 2 and 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 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; 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 the stock for \$50.5310 at Time 3 and 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.

9-7 VALUING THE ENTIRE CORPORATION¹¹

Corporate Valuation Model

A valuation model used as an alternative to the discounted dividend model to determine a firm's value, especially one with no history of dividends, or the value of a division of a larger firm. The corporate model first calculates the firm's free cash flows, then finds their present values to determine the firm's value.

Thus far we have discussed the discounted dividend model for 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 steadily growing dividends. However, dividends are dependent on earnings; so a really reliable dividend forecast must be based on an underlying forecast of the firm's future sales, costs, and capital requirements. This recognition has led to an alternative stock valuation approach, the **corporate valuation model**.

¹¹ 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 the discounting process is begun. Therefore, in the introductory course, some instructors may prefer to omit Section 9-7 and skip to Section 9-8.

EVALUATING STOCKS THAT DON'T PAY DIVIDENDS

The discounted dividend model assumes that the firm is currently paying a dividend. However, many firms, even highly profitable ones, including Google, 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; 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 future dividends, the value of its stock can be found as follows:

1. Estimate at what point 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); 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 Marvel-Lure Inc., a company that was set up in 2007 to produce and market a new high-tech fishing lure. Marvel-Lure's sales are currently growing at a rate of 200% 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% per year. The firm's management has announced that it will pay no dividends for 5 years but that 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% per year.

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

$$\begin{aligned}
 P_0 &= \frac{\$0}{(1.15)^1} + \cdots + \frac{\$0}{(1.15)^5} + \frac{\$0.20}{(1.15)^6} + \frac{\$0.30}{(1.15)^7} + \frac{\$0.40}{(1.15)^8} \\
 &\quad + \frac{\$0.45}{(1.15)^9} + \frac{\$0.50}{(1.15)^{10}} + \left(\frac{\$0.50(1.10)}{0.15 - 0.10} \right) \left(\frac{1}{(1.15)^{10}} \right) \\
 &= \$3.30
 \end{aligned}$$

The last term finds the expected stock price in Year 10 and then finds the present value of that price. Thus, we see that the discounted dividend 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.

Rather than starting with a forecast of dividends, the corporate valuation model focuses on the firm's future free cash flows. We discussed free cash flow (FCF) in Chapter 3, where we developed the following equation:

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

EBIT is earnings before interest and taxes, and free cash flow represents the cash generated from current operations, less the cash that must be spent on investments in fixed assets and working capital to support future growth. Consider the case of Home Depot (HD). The first term in brackets in the preceding equation represents the amount of cash that HD is generating from its existing stores. The second term

represents the amount of cash the company plans to spend this period to construct new stores. To open a new store, HD must spend cash to purchase the land and construct the building—these are the capital expenditures, and they lead to a corresponding increase in the firm's fixed assets as shown on the balance sheet. But HD also needs to increase its working capital, especially inventory. Putting everything together, HD generates positive free cash flow for its investors if and only if the money from its existing stores exceeds the money required to build and equip its new stores.

9-7a 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, its market value can be expressed as follows:

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

$$9-7 \quad = \frac{FCF_1}{(1 + WACC)^1} + \frac{FCF_2}{(1 + WACC)^2} + \cdots + \frac{FCF_{\infty}}{(1 + WACC)^{\infty}}$$

Here FCF_t is the free cash flow in Year t ; and the discount rate, the WACC, is the weighted average cost of all the firm's capital. When thinking about the WACC, note these two points:

1. The firm finances with debt, preferred stock, and common equity. The WACC is the weighted average of these three types of capital, and we discuss it in detail in Chapter 10.
2. Free cash flow is the cash generated *before any payments are made to any investors; so it must be used to compensate common stockholders, preferred stockholders, and bondholders*. Moreover, each type of investor has a required rate of return; and the weighted average of those returns is the WACC, which is used to discount the free cash flows.

Free cash flows are generally forecasted for 5 to 10 years, after which it is assumed that the final explicitly forecasted FCF will grow at some long-run constant rate. Once the company reaches its horizon date, when cash flows begin to grow at a constant rate, we can use the following formula to calculate the market value of the company as of that date:

$$9-8 \quad \text{Horizon value} = V_{\text{Company at } t=N} = FCF_{N+1} / (WACC - g_{FCF})$$

The corporate model is applied internally by the firm's financial staff and by outside security analysts. 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 9-2, which was reproduced from the chapter *Excel* model.

- Based on Allied's history and Buskirk's knowledge of the firm's business plan, she estimated sales, costs, and cash flows on an annual basis for 5 years. Growth will vary during those years, but she assumes that things will stabilize and growth will be constant after the fifth year. She would have made explicit forecasts for more years if she thought it would take longer to reach a steady-state, constant growth situation.
- Buskirk next calculated the expected free cash flows (FCFs) for each of the 5 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. It

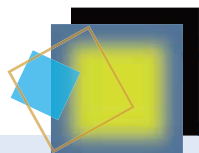
Table 9-2

Allied Food Products: Free Cash Flow Valuation

	A	B	C	D	E	F	G	H
133	Part 1. Key Inputs			Forecasted Years				
134				2009	2010	2011	2012	2013
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			40.0				
140	WACC			10.0				
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			2008	2009	2010	2011	2012	2013
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	EBIT $\times (1 - T)$	\$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, 2013							
160	Free Cash Flow (2014)		\$114.9					
161	Terminal Value at 2013, TV		\$2,872.7					
162	PV of the 2013 TV		\$1,783.7					
163								
164	Calculation of Firm's Intrinsic Value							
165	Sum of PVs of FCFs, 2009-2013		\$245.1					
166	PV of 2013 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					

follows that: Horizon Value at $t = 5 = FCF_6 / (WACC - g_{FCF})$, where g_{FCF} represents the long-run growth rate of free cash flow.

- 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.
- Then she subtracted the value of the debt and preferred stock to find the value of the common equity.
- 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; if the estimated intrinsic value had been well above the market price, she would have called the stock a "Buy."



OTHER APPROACHES TO VALUING COMMON STOCKS

While the dividend growth and the corporate valuation 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 have a claim not only on current earnings but also 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 121.2 at a time when the median firm has a P/E of 19.7. 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, the stock's price may be too high. Likewise, if a company's P/E ratio falls well below its historical average, the stock may be 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 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 discounted dividend model. More than a quarter of all stocks listed on the NYSE pay no dividends. This proportion is even higher on Nasdaq. While the discounted dividend model can still be used for these stocks (see "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 what the future dividend growth rate will be. In many cases, these forecasts contain considerable errors.

An alternative approach is based on the concept of Economic Value Added (EVA), which we discussed in Chapter 4 in "Economic Value Added (EVA) versus Net Income," that can be written as follows:

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

This equation suggests that companies can increase their EVA by investing in projects that provide shareholders with returns that are above their cost of equity capital, which is the return they could expect to earn on alternative investments with the same level of risk. When you purchase 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 follows:

$$\text{Market value of equity} = \text{Book value} + \text{PV of all future EVAs}$$

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

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

^aWhat 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, read the article "Measuring Wealth," by Charles M. C. Lee, in *CA Magazine*, April 1996, pp. 32–37.

9-7b Comparing the Corporate Valuation and Discounted Dividend Models

Analysts use both the discounted dividend model and the corporate valuation model when valuing mature, dividend-paying firms; and they generally use the corporate model when valuing divisions and firms that do not pay dividends. In

principle, we should find the same intrinsic value using either model, but differences are often observed. When a conflict exists, the assumptions embedded in the corporate model can be reexamined; and once the analyst is convinced they are reasonable, the results of that model are used. In our Allied example, the estimates were extremely close—the discounted dividend model predicted a price of \$23.06 per share versus \$23.38 using the corporate model; both are essentially equal to Allied’s actual \$23.06 price.

In practice, intrinsic value estimates based on the two models normally deviate 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 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 corporate model or the discounted dividend model to value stocks? We would argue that it does. If we had to value, for example, 100 mature companies whose dividends were expected to grow steadily in the future, we would probably use the discounted dividend model. Here we would estimate only 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 company 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. Because we would already have projected future financial statements, we would go ahead and apply the corporate model. Intel, which pays a dividend of \$0.56 versus earnings of about \$1.17, is an example of a company where either model could be used; but we think the corporate model is better.

Now suppose you were trying to estimate the value of a company such as eBay that, to date (2008), has never paid a dividend or a new firm that is about to go public. In either situation, you would be better off using the corporate valuation model. Actually, even if a company is paying steady dividends, much can be learned from the corporate model; so analysts today use it for all types of valuations. The process of projecting future financial statements can reveal a great deal about a 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 for companies that have a history of paying dividends?

What steps are taken to find a stock price using the corporate model?

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

9-8 PREFERRED STOCK¹²

Preferred stock is a *hybrid*—it is similar to a bond in some respects and to common stock in others. This hybrid nature becomes apparent when we try to classify preferred stock in relation to bonds and common stock. Like bonds, preferred

¹²Preferred stock is discussed in more detail in Chapter 20 of *Fundamentals of Financial Management*, 12th ed., (Mason, OH: Cengage Learning, 2010) and in Chapter 20 of Brigham & Daves, *Intermediate Financial Management*, 9th ed., (Mason, OH: Thomson/South-Western, 2007).