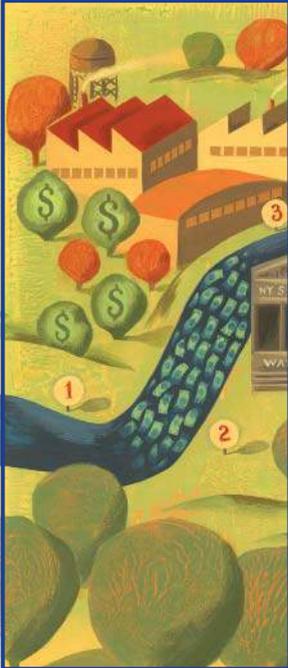


# THE VALUATION AND CHARACTERISTICS OF STOCK

## CHAPTER OUTLINE



### Common Stock

- The Return on an Investment in Common Stock
- The Nature of Cash Flows from Common Stock Ownership
- The Basis of Value

### Growth Models of Common Stock Valuation

- Developing Growth-Based Models
- The Constant Growth Model
- The Expected Return
- Two-Stage Growth
- Practical Limitations of Pricing Models

### Some Institutional Characteristics of Common Stock

- Corporate Organization and Control

- Voting Rights and Issues
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### Securities Analysis

#### Options and Warrants

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- Call Options
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- Options and Leverage
- Trading in Options
- Writing Options
- Put Options
- Option Pricing Models
- Warrants
- Employee Stock Options

In this chapter we'll be concerned with determining the value of equity securities, including common and preferred stock. We'll find the process is much less precise than the procedures we studied for bonds because of the nature of equity cash flows.

## COMMON STOCK

Corporations are owned by the holders of their common stock. Stockholders choose directors, who in turn appoint managers to run the company. In theory this means that stockholders have a voice in running the company through the board of directors.

However, most large companies are *widely held*, meaning that stock ownership is spread among a large number of people with no individuals or groups controlling more than a few percent. Under those conditions, stockholders have little power to influence corporate decisions, and stock ownership is simply an investment.

In other words, we don't tend to think of having any role as *owners* when we buy stock. We're just interested in the future cash flows that come from owning shares. In that sense, *equity* (stock) investments are just like *debt* (bond) investments; the only thing we're interested in is money.

## THE RETURN ON AN INVESTMENT IN COMMON STOCK

In a stock investment, income comes in two forms. Investors receive dividends and realize a gain or loss on the difference between the price they pay for stock and the price at which they eventually sell it. This last part is called a *capital gain* or *loss*.

Most **equity** investors aren't interested in a role as **owners**.

It pays to be precise about this idea and write it as an equation. Suppose we buy a share of stock, hold it for one year, and then sell it. Call the price we pay today  $P_0$  and the price at the end of one year  $P_1$ . If we receive a dividend during the year, call that  $D_1$ . Then our income is the dividend,  $D_1$ , plus the difference in prices,  $(P_1 - P_0)$ , and our investment is the original price,  $P_0$ . The return,  $k$ , can be written as

$$(8.1) \quad k = \frac{D_1 + (P_1 - P_0)}{P_0}$$

Notice that the return on a stock investment can be a negative number if the stock's price decreases while the investor holds it. In the equation, this means  $P_1 < P_0$ .

Next we'll solve equation 8.1 for  $P_0$ , the stock's price today. To do that multiply through by  $P_0$ ,

$$kP_0 = D_1 + (P_1 - P_0)$$

add  $P_0$  to each side, and then factor it out on the left.

$$\begin{aligned} P_0 + kP_0 &= D_1 + P_1 \\ (1 + k)P_0 &= D_1 + P_1 \end{aligned}$$

Finally, divide through by  $(1 + k)$  to get

$$(8.2) \quad P_0 = \frac{D_1 + P_1}{(1 + k)}$$

Notice that  $D_1$  and  $P_1$  are the future cash flows that come from buying the stock today at price  $P_0$ . Further notice that division by  $(1 + k)$  is equivalent to multiplying by the present value factor for interest rate  $k$  and one year. (See page 228.)

Therefore, equation 8.2 says that *the return on our stock investment is the interest rate that equates the present value of the investment's expected future cash flows to the amount invested today, the price  $P_0$ .*

This result is fundamental. The return on any stock investment is the rate that makes the present value of future cash flows equal to the price paid for the investment today. This principle also holds for investments held for more than one year.

### Dividend and Capital Gain Yields

The return on a stock investment can be broken into two parts related to the two sources of income associated with stock ownership. Rewrite equation 8.1 as two fractions.

$$(8.3) \quad k = \frac{D_1}{P_0} + \frac{(P_1 - P_0)}{P_0}$$

The first part,  $D_1/P_0$ , is known as the **dividend yield**, and the second part,  $(P_1 - P_0)/P_0$ , is called the **capital gains yield**.

## THE NATURE OF CASH FLOWS FROM COMMON STOCK OWNERSHIP

As we've said, an investor who buys stock can expect two forms of future cash flow: a stream of dividends and the proceeds of the eventual sale of the shares.

The **future cash flow** associated with stock ownership consists of **dividends** and the eventual **selling price** of the shares.

The **return** on a stock investment comes from **dividends** and **capital gains**.

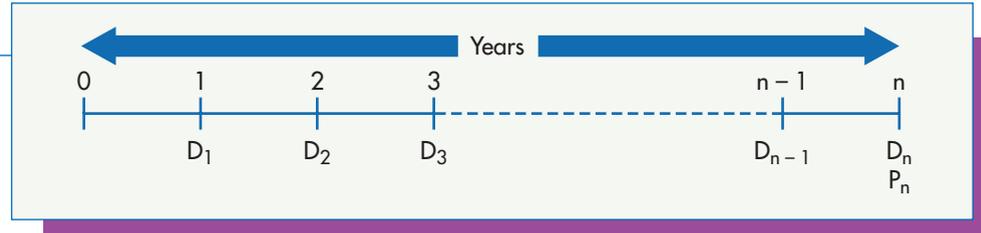
**Figure 8.1****Cash Flow Time Line for Stock Valuation**

Figure 8.1 is a time line reflecting these ideas for an investment made today and held for  $n$  years. In our work with stock valuation, we'll use annual time periods<sup>1</sup> and indicate payments in a particular year by subscripting the symbol for the payment with the number of the year.

For example,  $D_1$  and  $D_2$  will mean the dividends paid in the first and second years, respectively, and  $P_n$  will mean the price of the stock at the end of the  $n$ th year. We'll indicate the present with a zero subscript, so  $P_0$  means the price today and  $D_0$  means today's dividend or the most recent one paid.

We'll assume an investor buying today pays  $P_0$ , but does not receive  $D_0$ , which went to the last owner.

### Comparison of Cash Flows from Stocks and Bonds

Notice that the cash flow pattern for stocks appears similar to the one associated with bonds. In both cases a series of regular payments is followed by a single larger payment that can be thought of as the return of the original investment. That is, dividends seem analogous to interest payments, while the final sale of stock appears to be like the return of a bond's principal.

In fact, however, the similarity is rather superficial because of the differing natures of the cash flows in the two cases. It's worthwhile to explore those differences rather carefully. We'll begin by comparing interest and dividends.

A bond's interest payments are guaranteed by the borrower, and are therefore fairly certain to be received. Companies have to be very close to failure before they default on bond interest. Dividends, on the other hand, carry no such guarantee. This is an important point. There's no agreement associated with common stock that makes any representation about the payment of dividends. Investors depend on them for value, but nothing is committed, promised, or guaranteed by the company. Indeed, a firm with a long history of paying dividends can stop at any time, especially if business turns bad.

Next, recall that the interest payments associated with a bond are constant in amount. That makes it easy to develop a formula to value bonds, because interest can be represented as an annuity. Dividends, on the other hand, are rarely constant. In fact, people generally expect dividends to increase over time as the company grows.

Things are equally imprecise with respect to the final payments received by stockholders versus bondholders. With a bond, the payment is the contractually promised loan principal equal to the bond's face value. A stockholder, on the other hand, has to sell his or her shares at the prevailing market price to realize a final payment. This price can be higher or lower than the price originally paid.

1. Dividends are generally paid quarterly, but for valuation purposes things are simplified by working in annual terms.

Let's emphasize that last point even further. There's no provision in a common stock investment for the repurchase of shares or for any return of the investor's capital by the company. That means the money for the final payment comes from another investor rather than from the issuing company as it does with a bond.<sup>2</sup>

In summary, the cash flows associated with stock ownership are dividends and the proceeds of the eventual sale of the shares. Both are distinctly imprecise and difficult to forecast.

The **basis for stock value** is the **present value** of expected **cash inflows** even though dividends and stock prices are difficult to forecast.

## THE BASIS OF VALUE

In spite of the imprecision of forecasted dividends and prices, the value of stock depends on the present value of those future cash flows. In terms of the portrayal in Figure 8.1, the stock's value is the sum of the present value of the  $n$  dividend payments and the present value of the selling price in the  $n$ th period. Keep in mind that the successive dividends generally have different values, so we have to distinguish between them by carrying the subscripts in  $D_1$ ,  $D_2$ , through  $D_n$ .

Valuing a stock involves making some *assumptions* about what its future dividends and its eventual selling price will be. Once this has been done we take the present value of the *assumed* (projected) cash flows at an appropriate interest rate to estimate the share's current price. Contrast this with bond valuation. There we had no need to make any assumptions about the future cash flows because they were spelled out by the bond contract.

We can write a generalized stock valuation formula from these ideas by treating the dividends and the selling price as a series of independent amounts to be received at various times in the future.

Equation 6.7 on page 228 gave us an expression for the present value of an amount to be received  $n$  periods in the future at interest rate  $k$ . We'll repeat that expression here for convenience.

$$(6.7) \quad PV = FV_n [PVF_{k,n}]$$

Now think of each dividend and the eventual selling price shown in Figure 8.1 as an  $FV_n$ , where  $n$  is the number of periods into the future until that particular amount is received. The present value of the first dividend can be written as  $D_1 [PVF_{k,1}]$ . The second is  $D_2 [PVF_{k,2}]$ , and so on through the  $n$ th dividend and the price in the  $n$ th period.

$P_0$ , the value of the stock today, is the sum of all these amounts, and can be written as follows.

$$(8.4) \quad P_0 = D_1 [PVF_{k,1}] + D_2 [PVF_{k,2}] + \dots + D_n [PVF_{k,n}] + P_n [PVF_{k,n}]$$

### Example 8.1

Joe Simmons is interested in the stock of Teltex Corp. He feels it is going to have two very good years because of a government contract, but may not do well after that. Joe thinks the stock will pay a dividend of \$2 next year and \$3.50 the year after. By then he believes it will be selling for \$75 a share, at which price he'll sell anything he buys now. People who have invested in stocks like Teltex are currently earning returns of 12%. What is the most Joe should be willing to pay for a share of Teltex?

2. If a bond isn't held until maturity, it too must be sold to another investor, but the bondholder always has the option of holding it until maturity and receiving face value.

**SOLUTION:** Joe shouldn't pay any more than the present value of the cash flows he expects. Those are \$2 at the end of one year and \$3.50 plus \$75 at the end of two years. Writing equation 8.4 for two years, we have

$$\begin{aligned} P_0 &= D_1[PVF_{k,1}] + D_2[PVF_{k,2}] + P_2[PVF_{k,2}] \\ &= \$2.00[PVF_{12,1}] + \$3.50[PVF_{12,2}] + \$75.00[PVF_{12,2}] \\ &= \$2.00[.8929] + \$3.50[.7972] + \$75.00[.7972] \\ &= \$64.37 \end{aligned}$$

If the market price of Teltex is below about \$64, Joe should buy; if not, he shouldn't invest.

A stock's **intrinsic value** is based on **assumptions** about future cash flows made from **fundamental analyses** of the firm and its industry.

[http://](http://www.wsrn.com)

Stock quotes and other financial data can be found at <http://www.wsrn.com>

Stock valuation models are based on **predicted growth rates**, because forecasting exact future prices and dividends is very difficult.

### The Intrinsic (Calculated) Value and Market Price

Example 8.1 illustrates a basic principle of securities analysis. Joe's research led him to forecast the future dividends and price given in the example. According to his analysis, the present value of those cash flows is fundamentally what the stock is worth. We call that the stock's intrinsic value (according to Joe).

However, if other investors don't agree with Joe's dividend and price estimates, their ideas of Teltex's intrinsic value will differ from his. The firm's market price is generally thought to be a consensus of the intrinsic values calculated by everyone watching the stock. If Joe's value is higher than the consensus, and if he's right, he'll be getting a bargain if he buys.

The process of developing intrinsic values and comparing them with market prices is known as *fundamental analysis*. We'll come back to the idea later in the chapter.

## GROWTH MODELS OF COMMON STOCK VALUATION

Equation 8.4 is a convenient way to look at stock valuation when we have a relatively short planning horizon and some reason to make specific assumptions about future prices and dividends. Generally, however, we can't forecast the future in that much detail. We're more likely to look at a company and simply forecast a *growth rate* of earnings and dividends into the future starting from wherever they are now.

For example, suppose a company has grown at an average rate of 5% per year over the last three or four years, and we expect its condition to improve slightly in the short run. The future being as uncertain as it is, it's difficult to make the detailed forecast of dividends and future prices needed to use equation 8.4. However, most of us would be comfortable in saying that the company and its dividends are likely to grow at 6% into the indefinite future.

Because that's the best we can often do in predicting the future, we'll find it useful to develop expressions that value stocks on the basis of only their present positions and assumptions about growth rates.

### DEVELOPING GROWTH-BASED MODELS

Notice that equation 8.4 treats the stock's dividends and eventual selling price as separate amounts in the present valuing process. Each is multiplied by the present value factor for the appropriate interest rate and time, which is represented in the equation as  $PVF_{k,i}$ , where  $i$  takes values from 1 to  $n$ .

In Chapter 6 we developed the formulation of any  $PVF_{k,i}$ , which we'll repeat here for convenience.

$$(6.5) \quad PVF_{k,i} = \frac{1}{(1+k)^i}$$

Clearly, multiplying by  $PVF_{k,i}$  is equivalent to dividing by  $(1+k)^i$ . Review equation 6.5 on page 228 if this isn't familiar.

In what follows, we'll find it convenient to represent present values of amounts by dividing by  $(1+k)^i$  instead of multiplying by the factor of  $PVF_{k,i}$ . Rewriting equation 8.4 to reflect this change in notation, we have

$$(8.5) \quad P_0 = \frac{D_1}{(1+k)} + \frac{D_1}{(1+k)^2} + \cdots + \frac{D_n}{(1+k)^n} + \frac{P_n}{(1+k)^n}$$

### An Infinite Stream of Dividends

Notice again that our stock valuation formula, now represented by equation 8.5, involves a stream of dividends followed by a final selling price. This portrayal fits well with our concept of stock ownership: buy, hold for a while, and then sell. However, it's not convenient to work with in terms of valuation.

Think about  $P_n$ , the price at the end of the holding period. At that time, the  $n$ th period, it will represent the current price just as  $P_0$  represents the current price today. Therefore, its value then will involve a stream of dividends that starts in period  $n+1$  and a selling price at some point further into the future, say period  $m$ . In other words, the person who buys the stock in period  $n$  will hold it until period  $m$  and then sell it. That person's valuation model will look like this.

$$P_n = \frac{D_{n+1}}{(1+k)} + \cdots + \frac{D_m}{(1+k)^{m-n}} + \frac{P_m}{(1+k)^{m-n}}$$

Conceptually we can replace  $P_n$  in equation 8.5 with this expression, and wind up with a revised expression containing a longer stream of dividends and a final price further away in the future.

We can conceptually do the same thing again in period  $m$ . That is, we can think about the next sale, and replace  $P_m$  with another series of dividends followed by a price in the still more distant future. We can do that as many times as we like and push the eventual selling price as far into the future as we like. Indeed, we can conceptually push the final  $P$  infinitely far into the future!

However, the present value of any amount that is infinitely far away in time is clearly zero, so equation 8.5 becomes the present value of an infinitely long stream of dividends and nothing else.

In short, we've replaced the final selling price with the rest of the dividends forever. This more useful valuation expression is written as follows by using summation notation.

$$(8.6) \quad P_0 = \sum_{i=1}^{\infty} \frac{D_i}{(1+k)^i}$$

### A Market-Based Argument

If shifting from equation 8.5 to 8.6 seems strange, here's another way to convince yourself that it makes sense.

A stock's **value today** is the sum of the **present values** of the **dividends** received while the investor holds it and the **price** for which it is eventually sold.

Conceptually, it's possible to **replace** the final selling **price** with an **infinite series of dividends**.

Imagine that we're pricing a primary market transaction, one in which the firm is initially offering its stock to the investing public. Think of the investment community *as a whole* setting the stock's price. In other words, ignore the fact that individual investors will subsequently trade the stock back and forth among themselves, and think of them as one unified body setting a price for the stock when it's issued. In fact, that's exactly what the market process does.

This price, set by the market acting collectively, must be based on the present value of future cash flows moving from the company to the investing community. But there's only one kind of payment that moves from the company to investors, and that's dividends. So the only basis for valuation by the community as a whole is the entire future stream of dividends; there's nothing else available. This leads directly to equation 8.6.

### Working with Growth Rates

Growth rates work just like interest rates. If we're told that something whose value is \$100 today will grow at 6% next year, the amount of the growth is

$$\$100 \times .06 = \$6$$

and the new size of the variable is

$$\$100 \times 1.06 = \$106$$

We usually represent growth rates with the letter  $g$ , which takes the decimal value of the percentage rate. For example, a 6% growth rate implies  $g = .06$ .

Growth rates are usually used to predict future values of variables whose values are known today. For example, if today's dividend is  $D_0$  and we want to forecast year 1's dividend,  $D_1$ , assuming growth rate  $g$ , we can write

$$\begin{aligned} D_1 &= D_0 + gD_0 \\ &= D_0(1 + g) \end{aligned}$$

Year 2's dividend is just year 1's multiplied by  $(1 + g)$  again.

$$D_2 = D_1(1 + g)$$

Noticing the expression for  $D_1$  just above, we can substitute and write

$$D_2 = D_0(1 + g)^2$$

$D_3$  is this expression multiplied by  $(1 + g)$  again, and so on for as many subsequent  $D$ 's as we need. In general the  $i$ th dividend is

$$(8.7) \quad D_i = D_0(1 + g)^i$$

When successive values of a growing dividend are needed, we just multiply by  $(1 + g)$  repeatedly.

### Example 8.2

Apex Corp. paid a dividend of \$3.50 this year. What are its next three dividends if it is expected to grow at 7%?

**SOLUTION:** In this case  $D_0 = \$3.50$  and  $g = .07$ , so  $(1 + g) = 1.07$ . Then

$$D_1 = D_0(1 + g) = \$3.50(1.07) = \$3.75,$$

$$D_2 = D_1(1 + g) = \$3.75(1.07) = \$4.01, \text{ and}$$

$$D_3 = D_2(1 + g) = \$4.01(1.07) = \$4.29.$$

## THE CONSTANT GROWTH MODEL

Equation 8.6 says that the value of a stock is the present value of an infinite stream of dividends but makes no statement about what those dividends are. In other words, the  $D_1, D_2, \dots, D_n$  can have any values, randomly chosen or a regular progression of numbers.

When we know  $D_0$ , the last dividend paid, and we assume dividends will grow at some constant rate in the future, equation 8.7 gives us a convenient way to forecast any particular dividend.

We can put these two ideas together by substituting equation 8.7 into 8.6 and rewriting as follows.

$$(8.8) \quad P_0 = \sum_{i=1}^{\infty} \frac{D_0(1+g)^i}{(1+k)^i}$$

This expression is the basis of the constant growth model. It represents the sum of an infinite series of fractions as follows.

$$P_0 = \frac{D_0(1+g)}{(1+k)} + \frac{D_0(1+g)^2}{(1+k)^2} + \frac{D_0(1+g)^3}{(1+k)^3} + \dots \infty$$

Notice that the numerators represent a series of dividends, each of which is larger than the last because of multiplication by the factor  $(1+g)$ . The denominators reflect the present value factors for successive years into the future. These too get successively larger because of multiplication by  $(1+k)$ .

Because  $D_0$  appears in each term of the series, it can be factored out, and we have

$$(8.9) \quad P_0 = D_0 \left[ \frac{(1+g)}{(1+k)} + \frac{(1+g)^2}{(1+k)^2} + \frac{(1+g)^3}{(1+k)^3} + \dots \infty \right]$$

Now, if  $k$  is larger than  $g$ , the fractions in the brackets get smaller as the exponents get larger. Both the numerators and denominators become larger numbers as the exponents grow, but if  $k$  is bigger than  $g$ , the denominators get large faster. Any fraction whose denominator is much larger than its numerator is a very small number. In this case the successive fractions approach zero as the exponents get big.

As a result, the entire expression in brackets is a *finite* number when  $k$  is larger than  $g$ . This leads to a finite value for  $P_0$  even though we're summing an infinite stream of numbers to get it.

When  $k$  is larger than  $g$ , we say we're forecasting *normal growth*. When  $g$  is greater than  $k$ , we say we have *super normal growth*. Super normal growth can occur in business, but lasts for limited periods. We'll consider it in detail later. For now we'll concentrate on normal growth situations.

### Constant Normal Growth—The Gordon Model

Equations 8.8 and 8.9 look pretty intimidating, but can be reduced to something simple with a little mathematics that we needn't worry about here. We'll just accept the result.

The simplified form of equation 8.8 is

$$(8.10) \quad P_0 = \frac{D_0(1+g)}{k-g} = \frac{D_1}{k-g}$$

In stock valuation, **normal growth** occurs when  $k > g$ .

The **Gordon model** is a simple expression for forecasting the **price** of a stock that's expected to **grow at a constant, normal rate**.

This expression is known as the *constant growth model*, because it assumes that the stock's dividends are going to grow at the constant rate,  $g$ , into the indefinite future. It is also called the **Gordon model** after Myron J. Gordon, a scholar who was behind its development and popularization.

Notice that the equation makes sense only if growth is normal—that is, if  $k > g$ . Otherwise the denominator is negative (or zero), leading to a negative (or undefined) price which isn't meaningful.

Also notice that the numerator can be expressed either as  $D_0(1 + g)$  or as  $D_1$ . Keep in mind that  $D_0$  is the most recent dividend paid to the stock's former owner.  $D_1$  is the next dividend. It is the first one that will be received by someone who buys the stock today. Think of  $D_1$  as the *first dividend into the period of normal growth*. That image will help your understanding later in the chapter.

The constant growth model is easy to use. Here's a straightforward example.

### Example 8.3

Atlas Motors is expected to grow at a constant rate of 6% a year into the indefinite future. It recently paid a dividend of \$2.25 a share. The rate of return on stocks similar to Atlas is about 11%. What should a share of Atlas Motors sell for today?

**SOLUTION:** Write equation 8.10 and substitute  $D_0 = \$2.25$ ,  $k = .11$ , and  $g = .06$ .

$$P_0 = \frac{D_0(1 + g)}{k - g} = \frac{\$2.25(1.06)}{.11 - .06} = \$47.70$$

This price includes the value of all dividends to be paid after time zero but does not include  $D_0$ , which has already been paid to the stock's current owner.

### The Zero Growth Rate Case—A Constant Dividend

It is of interest to value a stock that's expected to pay a constant, never-changing dividend. In that case we don't need a subscript on the variable representing the dividends because they're all the same. We'll call each dividend  $D$ .

This case can be represented by equation 8.10 if we let  $g$  equal zero, and then  $D_0 = D_1 = D$  and 8.10 becomes

$$(8.11) \quad P_0 = \frac{D}{k}$$

You should recognize equation 8.11 as the expression for the present value of a perpetuity from our work in Chapter 6. (See page 253.) A perpetuity is an unchanging payment made regularly for an indefinite period of time. That's exactly what we're describing in the constant dividend model.

A **zero growth** stock is a **perpetuity** to the investor.

### Example 8.4

Lexington Corp. is in a stagnant market, and analysts foresee a long period of zero growth for the firm. It's been paying a yearly dividend of \$5 for some time, which is expected to continue indefinitely. The yield on the stock of similar firms is 8%. What should Lexington's stock sell for?

**SOLUTION:** Write equation 8.11 and substitute.

$$P_0 = \frac{D}{k} = \frac{\$5}{.08} = \$62.50$$

People don't usually assume that common stock will pay the same dividend forever. It's more usual to assume some positive growth rate. There is, however, a security known as *preferred stock* that does pay the same dividend year after year with no expectation of increase or decrease. We'll study it later in the chapter.

The **expected return** reflects investors' **knowledge** of a company. It is input to the Gordon model through the growth rate assumption.

## THE EXPECTED RETURN

The Gordon model can be recast to focus on the return on the stock investment implied by the constant growth assumption. This is easily done by solving equation 8.10 for  $k$ . In this formulation,  $k$  represents an **expected return**, and is often written as  $k_e$ .

$$(8.12) \quad k_e = \frac{D_1}{P_0} + g$$

The concept of expected return will be important in the next chapter. In this case, it says that if an investor's knowledge and predictions about a company's stock are rolled up into a forecast growth rate, the return implied by the forecast is given by equation 8.12.

If we take  $D_1 = D_0(1 + g)$  and assume that  $D_0$  and  $P_0$  are actual values of the latest dividend and the current price, the equation gives an estimate of the return to be had by investing in the stock at price  $P_0$ .

It's worthwhile to compare equation 8.12 with 8.1, which we'll repeat here for convenience.

$$(8.1) \quad k = \frac{D_1}{P_0} + \frac{(P_1 - P_0)}{P_0}$$

Recall that the two terms on the right side of equation 8.1 are the dividend yield and the capital gains yield. Compare equation 8.12 with 8.1 and notice that they're identical in all but the second term on the right. This implies that those terms have the same meaning in both equations. In other words, the capital gains yield in the Gordon model is nothing but the growth rate. That makes intuitive sense because the whole company, including dividends and stock prices, is assumed to be growing at rate  $g$ .



## TWO-STAGE GROWTH

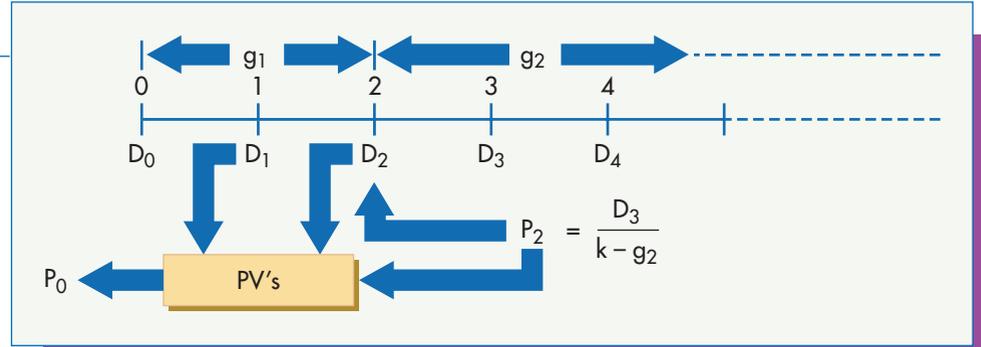
Situations sometimes arise in which a firm's future growth isn't expected to be constant. Specifically, we often know something about the near-term future that can be expected to have a *temporary* effect on the firm's prospects. For example, the release of a new product might create a period of rapidly expanding demand after which further growth slows to normal.

The usual *two-stage* forecast involves a rapid, *super normal* growth rate for one, two, or even three years and a *normal* rate thereafter. Recall that super normal means a rate in excess of  $k$ , the return on the stock. Our task is to use the tools we've developed thus far to value a stock that's expected to behave in this way.

First let's look at a time line picture of such an investment opportunity. The top of Figure 8.2 shows a general case in which the firm grows at rate  $g_1$ , the super normal rate, for two years and then grows indefinitely at rate  $g_2$ , the slower normal rate.

Figure 8.2

## Two-Stage Growth Model



We can value this stock using the constant growth model, but we have to apply it carefully. The model gives us a value for a share of stock *at the beginning of an infinite period of constant, normal growth*.

In Figure 8.2 we have constant, normal growth, but it doesn't start at time zero. It starts at the end of the second year. Therefore, we have to apply the Gordon model at that point in time.

When we do that, the result is a price for the stock at the end of the second year, or equivalently at the beginning of the third. We'll call that price  $P_2$ . It includes the value of all dividends to be paid subsequent to year 2, but not the dividend of year 2 itself,  $D_2$ . In other words, it takes into account  $D_3$ ,  $D_4$ ,  $D_5$ , and so on.

Using the Gordon model at the end of the second year requires a modification of the notation we used before. Look back at equation 8.10. Notice that the numerator in that expression is  $D_1$ , which is *the first dividend into the period of normal growth*. In the model we're working with now, that's  $D_3$ , because the growth rate changes at the end of year 2.

In addition, the denominator of equation 8.10 contains the normal growth rate  $g$ . In this case we have two growth rates but the normal one that continues indefinitely is  $g_2$ , so that's the one we must use. The correct way to formulate the constant growth model in this application is

$$P_2 = \frac{D_3}{k - g_2}$$

This expression is portrayed in Figure 8.2 along with its position along the time line.

A person buying this stock today gets three things in the future:  $D_1$ ,  $D_2$ , and  $P_2$ . The two dividends are clearly cash flows forecast at the ends of years 1 and 2.  $P_2$ , on the other hand, is an actual cash flow only if the purchaser sells the stock at the end of the second year. Nevertheless, we'll treat  $P_2$  just as though it was a cash flow expected two years in the future.

The value of a security today is the present value of future cash that comes from owning it, so the value of the stock represented in Figure 8.2 is the sum of the present values of  $D_1$ ,  $D_2$ , and  $P_2$ . This is indicated schematically in the diagram.

## Example 8.5

Zylon Corporation's stock is selling for \$48 a share according to *The Wall Street Journal*. We've heard a rumor that the firm will make an exciting new product announcement next week. By studying the industry, we've concluded that this new product will support an overall company growth rate of 20% for about two years. After that, we feel growth will slow rapidly and level

The **two-stage growth model** allows us to value a stock that's expected to grow at an unusual rate for a **limited time**.

off at about 6%. The firm currently pays an annual dividend of \$2, which can be expected to grow with the company. The rate of return on stocks like Zylon is approximately 10%. Is Zylon a good buy at \$48?

**SOLUTION:** To determine whether Zylon is a good buy, we'll estimate what it *should* be worth on the basis of the present value of future cash flows, and compare that result with the listed price. If our valuation is higher, we might conclude that the stock is a bargain and buy it.

Drawing a diagram similar to Figure 8.2 generally helps in problems like this. The following time line shows the growth rates and dividends.

The dividend paid recently,  $D_0$ , is given as \$2.00. The first future dividend is forecast by growing \$2.00 at the first year's growth rate. That's accomplished by multiplying by 1 plus the growth rate in that year.

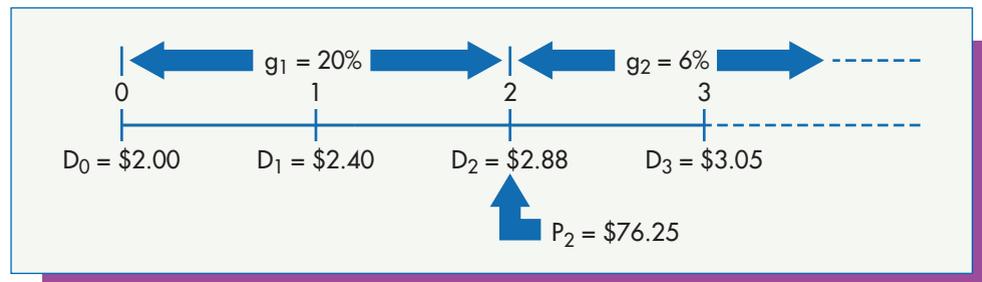
$$D_1 = D_0(1 + g_1) = \$2.00(1.20) = \$2.40$$

To get the second year's dividend we multiply by  $(1 + g_1)$  again.

$$D_2 = D_1(1 + g_1) = \$2.40(1.20) = \$2.88$$

We do *nearly* the same thing for  $D_3$ . The firm is now growing at rate  $g_2$ , which is 6% in this example.

$$D_3 = D_2(1 + g_2) = \$2.88(1.06) = \$3.05$$



Next we use the Gordon model *at the point in time where the growth rate changes and constant growth begins*. That's year 2 in this case, so

$$P_2 = \frac{D_3}{k - g_2} = \frac{\$3.05}{.10 - .06} = \$76.25$$

This result is also indicated in the diagram.

All that remains in calculating a price is to take the present value of each of the elements to which a buyer at time zero is entitled and add them up; these are  $D_1$ ,  $D_2$ , and  $P_2$ .

$$P_0 = D_1[PVF_{k,1}] + D_2[PVF_{k,2}] + P_2[PVF_{k,2}]$$

$$P_0 = \$2.40[PVF_{.10,1}] + \$2.88[PVF_{.10,2}] + \$76.25[PVF_{.10,2}]$$

$$P_0 = \$2.40[.9091] + \$2.88[.8264] + \$76.25[.8264]$$

$$P_0 = \$67.57$$

Now we compare \$67.57 with the listed price of \$48.00. Clearly our valuation is larger. If our assumptions are correct, the stock should be worth almost \$20 more than its current market price. If we're right, the price will rise substantially in a relatively short time, so we would be wise to buy.

from the **CFO**

## PRACTICAL LIMITATIONS OF PRICING MODELS

*It's important to remember that the growth rate models we've been studying are abstractions of reality. They're simplified representations of the real world that at best can give us only approximations of what's likely to occur in the future. We have to be careful not to view them as being accurate to the penny even though our calculations result in figures like the \$67.57 in the last example.*

*It's especially important to understand that our results can never be any more accurate than the inputs that go into the model. In this case those inputs are the projected growth rates and the interest rate.*

Growth rate estimates are guesses that can be off by quite a bit. For example, in the case we've just illustrated the predicted 20% growth rate could actually turn out to be anything from 15% to 25%. Rates at either end of this range will make a big difference in the figure we finally get for  $P_0$ .

The exact interest rate isn't always known either. The rates of return that people require to invest in stocks vary according to the risk they perceive in any particular company. Different investors have different perceptions, so our 10% rate might easily be 9% or 11%.

Another big source of inaccuracy comes from the denominator of the Gordon model. Notice that it's the difference between two of our inputs, the interest rate and a growth rate. If those numbers are estimated to be close together, their difference is small and the calculated price blows up because a small denominator makes the value of a fraction large.

Look at the calculation of  $P_2$  in Example 8.5. The denominator of the fraction,  $k - g_2$ , is  $(.10 - .06 =) .04$ . But suppose our estimates of  $k$  and  $g_2$  were a little off, and  $k$  should have been 9% and  $g_2$  more like 7%. Then the denominator would have been  $(.09 - .07 =) .02$  and  $P_2$  would have been \$154.08. [The numerator would also change to  $(\$2.88 \times 1.07 =) \$3.08$ .] This would have made  $P_0$  \$131.89 rather than \$67.57. That's a 95% difference in the estimated value of the stock coming from input errors that are relatively much smaller (10% for  $k$  and 17% for  $g_2$ )!

The point is that when it comes to estimating stock prices, finance is not engineering! Our numbers just aren't all that accurate. Keep that in mind when using the results the way we did in the last example. The estimated value of the stock turned out to be \$67.57, which looked very good in comparison with the \$48 market price. But suppose the stock had been selling for \$62 instead of the example's \$48. Could we have concluded that it was still a bargain, although not as big a one? In other words, could we expect to make \$5.57 on the purchase of a share?

The answer to that question is probably no. The difference of about \$5 out of \$67 isn't large enough to overcome the margin for error inherent in the estimating process. At a market price of \$48 we'd be pretty sure we had something, but at \$62 we really can't say much at all. Basically, the result would be saying the stock is worth in the neighborhood of \$65 or \$70. Any finer estimates than that are meaningless.

### Comparison with Bond Valuation

The comments about inaccuracy in the last section refer only to stock valuation; bonds are a completely different story. The bond pricing model gives a precise valuation for the security, because the future cash flows are contractually guaranteed in amount and time. Unless a borrowing company defaults on its obligation, which is rare among higher grade issues, we can predict the exact pattern of future interest and principal payments. Having that, we can determine the price exactly for any yield. Yields in turn are established quite accurately by market forces influenced by the stability of the issuing company and the term of the debt.

**Stock** valuation models give **approximate** results because the inputs are approximations of reality. **Bond** valuation is **precise** because the inputs are exact.



## PRACTICAL FINANCE

### Reconciling Valuation Theory and Practice

People who work with stock investing day in and day out aren't likely to think of valuation in terms of present value models. Brokers and frequent investors are more likely to work with earnings per share and price/earnings ratios to predict short-term price movements. The EPS model is expressed by the following relation.

$$(a) \quad P_0 = \text{EPS} \times P/E$$

where  $P_0$  is the stock's price, EPS is earnings per share, and  $P/E$  is the price/earnings ratio.

According to this view, to the extent that companies have different  $P/E$  ratios, the market values their earnings differently. For example, if two firms each earn \$1 per share, and their  $P/E$ s are 10 and 20, their stocks will sell for \$10 and \$20 regardless of the fact that their earnings are the same. In other words, the market puts a different value on a dollar of earnings depending on who makes it.

This doesn't seem consistent with the valuation models we've been studying, which say price is based on the present value of *dollar earnings only*.

Things get more confusing if you look at the relationship expressed in equation (a) closely. Mathematically, it's just an identity because  $P/E$  is just price over EPS. Hence, it reduces to

$$P_0 = \text{EPS} \times \frac{P_0}{\text{EPS}}$$

or

$$P_0 = P_0$$

which doesn't have much value for anything.

But in fact there's more to it than that. The stock market tends to fix short-run  $P/E$  ratios within ranges by industry. And within industries better performers get higher  $P/E$ s than poor performers. In other words, certain favored industries and certain favored companies are rewarded with higher than normal  $P/E$ s. That is, in the short run the  $P/E$  ratio is relatively stable, so price changes depend mainly on changes in recent earnings, EPS.

That still doesn't seem to reconcile well with the models that value stocks according to the present value of *future* cash flows until you realize two things. First, recent earnings are predictors of future earnings, so a higher EPS today means more earnings and dividends in the future. Second, countless studies have shown that the primary determinant of who gets what  $P/E$  is expected growth. The higher a company's expected growth, the higher its  $P/E$ .

That means equation (a) works like a crude Gordon model in which higher growth rates and higher current earnings both imply a higher current stock price. In other words, the seat-of-the-pants approach used by rough-and-tumble practitioners is very consistent with sophisticated valuation theory. That should give us all a sense of calm and well-being.

## Stocks That Don't Pay Dividends

Some companies pay no dividends even when their profits are high. Further, many openly state their intention never to pay dividends. Nevertheless, the stocks of such firms can have substantial value.

The growth models we've been working with base stock values solely on the present value of a dividend stream. How can such a model be valid if there are stocks with value that pay no dividends?

The answer to this puzzling question lies in understanding when and why firms pay no dividends to stockholders. Firms that don't pay dividends even when their earnings are good are usually in an early period of their development and growing rapidly. Growth requires cash, and managements feel it's futile to pay out dividends only to turn around and borrow or issue more stock to raise money to support that growth. Stockholders agree because they hope to own a piece of a much larger company if growth continues.

However, most people understand that rapid growth doesn't go on forever. When growth in the industry and firm slows down, even the most vocal non-dividend payers eventually begin paying. In other words, stocks that don't pay dividends today are expected to pay large dividends at some time in the future. It's those distant dividends that impart value.

If a company truly never paid a dividend, there would be no way for the investing community as a whole to *ever* get a return on its investment. And that doesn't make much sense.

There is an alternate, somewhat comical, explanation known as the *greater fool theory of investing*. It goes like this. People buy non-dividend-paying stocks for price appreciation—that is, with the intention of selling to other investors at higher prices than those at which they bought. But only a fool would buy an investment with no payback, so a buyer is depending on finding a *greater fool* later to buy at a higher price.

There's no doubt that investors sometimes behave as though they were operating under the greater fool theory, but in general we prefer the explanation involving the eventual payment of dividends.

Stocks that **don't pay dividends** have value, because there's a general expectation that **some day they will**.

**http://**

Current stock market information and data can be found at

**<http://www.businessweek.com/investor/index.html>**

## SOME INSTITUTIONAL CHARACTERISTICS OF COMMON STOCK

Common stock represents an investment in equity (ownership) that theoretically implies control of the company. That is, it's logical to assume that an ownership interest means a stockholder has some influence on the way the company is run.

As a practical matter, however, influence depends on how much stock is held by any one person or group. Because most management issues are decided by a majority vote, stockholders owning minority interests have little power when someone else has a clear majority or when no one owns a substantial percentage of the firm. To understand how all of this works, we have to look at how companies are run.

## CORPORATE ORGANIZATION AND CONTROL

Corporations are controlled by **boards of directors** whose members are elected by stockholders. The board appoints the firm's senior management, which in turn appoints middle and lower management and runs the company on a day-to-day basis. Major strategic decisions are considered by the board, but only a few really big issues, like mergers, must be voted on by the stockholders.



## REAL APPLICATIONS

### Corporate Governance in Large Companies: The Role of Boards of Directors

Do stockholders really control the companies they own through the election of boards of directors? In smaller companies the answer is definitely yes. Owners typically elect themselves or close associates to the board and control their businesses more or less directly. But in large, “widely held” corporations that answer has traditionally been no. When stock ownership is so dispersed that no one owns more than a small fraction of the enterprise, it has been virtually impossible for dissatisfied shareholders to influence management. They simply can’t get enough votes together to influence the board, which can alter corporate policy or change top management.

This condition has led to a serious problem. Top executives of major corporations act essentially without accountability. That means they’re unlikely to lose their positions of wealth and power for making poor or self-serving decisions. They’re paid fantastically well and often pursue business strategies that seem more related to their own empire-building interests than to the benefit of stockholders.

This issue became painfully apparent in 2001 and 2002 when several major corporations collapsed after the investing community discovered that top executives had been deceiving the public with phony financial reporting while paying themselves vast sums of money. The most publicized examples were Enron, a giant in the energy field; WorldCom, a major player in the telecommunications industry (MCI’s parent company); and Tyco, a diversified “conglomerate.”

One of the most distressing things coming out of the scandal was the revelation that the boards of directors of these companies had completely failed to protect the interests of shareholders. Indeed it seemed they weren’t even trying. Directors are often accused of rubber-stamping their approval on self-serving management decisions, but in these cases, some were alleged to have participated in the wrongdoing to the extent that criminal charges were filed against a few.

The events of the early 2000s led to a recognition of a *crisis of corporate governance*, which quickly drew the attention of the investing community, the accounting profession, and government. The most visible result was the passage of the Sarbanes-Oxley Act of 2002, which we discussed in detail in Chapter 5. The Act has been described as the most significant and far-reaching legislation regulating the financial industry since the SEC Act of 1934. It imposes stiff penalties on executives and board members for self-dealing and deceptive practices. It also takes a proactive approach by requiring corporate officers to certify that company financial statements are not misleading. Beyond Sarbanes-Oxley, the accounting profession and the New York Stock Exchange have instituted tough new disclosure rules.

New regulations and the threat of shareholder lawsuits, which can attack directors personally, have served as a wake-up call to board members across the country. Most have gotten the message that being a director isn’t the gravy train it used to be. Changes are taking place as a result. Directors who routinely awarded huge pay contracts to managements are now balking instead of rubber-stamping requests. Conflicts of interest between board members and management are now disqualifying some candidates. And there’s a trend toward serving on fewer boards so directors can more effectively focus their attention where they do serve.

Generally speaking boards are reforming. Directors include fewer insiders, director training seminars are popular, and the role of independent board members has become stronger. All this means more security for investors.

**Sources:** “The Best & Worst Boards. How the Corporate Scandals Are Sparking a Revolution in Governance,” *Business Week* (October 7, 2002); and “A Chronology of Enron’s Woes,” *The Wall Street Journal* (February 25, 2003).

Top **managers** effectively **control widely held companies**, because no stockholder group has enough power to remove them.

Corporate boards are generally made up of the company's top managers and a number of *outside directors*. Board members may be major stockholders, but they don't have to be.

Companies are said to be widely held when stock ownership is distributed among a large number of people and no single party or group has a significantly large share. When that happens it is very difficult to make a change in the board, because it's hard to organize voting stockholders against the incumbent members. In such situations, members of top management on the board have effective control of the company with little accountability to stockholders.

The outside directors are supposed to be a restraint on this autonomy of management, but generally don't do much along those lines.<sup>3</sup> Of course, when a substantial percentage of stock is under the control of a single group, that group has effective control of the company because it can elect board members. In widely held companies, 15% to 25% is generally enough for effective control if no one else has more than a few percent.

### The Role of the Equity Investor

As we said early in the chapter, most of the investors who buy stock in sizable companies don't look for a role in running the company. They're simply interested in the cash flows that come from stock ownership.

### Preemptive Rights

**Preemptive rights** allow stockholders to maintain their proportionate ownership of corporations. When new shares are issued, common stockholders have the right to purchase a portion of the new issue equal to the percentage of the outstanding shares they already own. If preemptive rights exist, current stockholders must be offered this option before the new shares can be sold to anyone else.

Preemptive rights are common, but there's generally no law requiring them. Hence, if stockholders have preemptive rights, it's because they were written into the company's rules of operation (called its charter, articles, or bylaws) by the people who originally formed the corporation.

## VOTING RIGHTS AND ISSUES

Most common stock comes with voting rights. That means each share gets an equal vote in the election of directors and on major issues. Voting issues are usually limited to changes in the company's charter, which broadly defines what it does, and questions about mergers.

Stockholders vote on directors and other items at an *annual stockholders' meeting* that corporations are required by law to hold. Most shareholders don't attend, however, and vote by **proxy** if at all. Proxies give the authority to vote shares to a designated party. Generally, the current board members solicit shareholders by mail for their proxies. If the firm's performance has been reasonably good, the proxies are given and the board is reelected.

A **proxy fight** occurs if parties with conflicting interests solicit proxies at the same time. This usually happens when a stockholder group is unhappy with management and tries to take over the board. We'll talk about proxy fights more in Chapter 17.

Each share of **common** stock has one vote in the election of directors, which is usually cast by **proxy**.

3. There have been a few notable exceptions in recent years in which CEOs have been removed by groups led by outside directors.

## Majority and Cumulative Voting

Suppose a company's stock is held by two groups of stockholders with differing interests. Also assume one group has a clear majority of the shares outstanding. Traditional *majority voting* gives the larger group control of the company to the virtual exclusion of the minority group. This is because each director is chosen in a separate election, so the majority group can win every seat.

**Cumulative voting** is a way to get some minority representation on the board. Under the cumulative method, each share of stock gets one vote for every seat being elected. Minority stockholders can then cast all their votes for one seat or split them up among several elections. This means the minority interest can concentrate its votes on one or two seats and be likely to win, thereby getting some representation on the board.

## Shares with Different Voting Rights

It's possible to issue more than one class of stock with different rights associated with each class. Along these lines, a practice that affects control involves issuing a class of stock with limited voting rights or with no votes at all. If such an issue receives the same dividends as traditional voting stock, it may be attractive to the typical investor who has no interest in control anyway.

Nonvoting stock was fairly common in the early part of this century, but has been unusual since the 1930s. At that time there was a general resistance to it from the government, the stock exchanges, and investors. The idea has reemerged recently, however, in association with mergers and acquisitions.

## STOCKHOLDERS' CLAIMS ON INCOME AND ASSETS

Stockholders have a **residual claim** on both income and assets. That means they are the last in line among all the claimants on the firm's resources.

With respect to income, stockholders own what's left after all operating costs and expenses are paid, after bondholders receive their interest and any principal due, and after preferred stockholders get their dividends. That doesn't sound like a very good deal, but it often is.

When business is bad, stockholders are in the worst position of all, because the company's money is more likely to run out before they're paid than before other claimants are paid. That's why common stock is considered the riskiest investment.

When business is good, however, the residual after everyone else is paid can be enormous, and it all belongs to the stockholders. Essentially, the "upside" potential in stock ownership is limitless.

The residual income belonging to stockholders is essentially earnings (EAT). It is either paid out to them in dividends or retained and reinvested in the business. Both options are clearly beneficial to stockholders. Dividends are immediate money in their pockets, while retained earnings contribute to growth that makes the stock more valuable.

With respect to assets, the residual position means that if the corporation fails and is liquidated, stockholders don't get anything until everyone else is paid. That often means they don't get anything at all.

## PREFERRED STOCK

*Preferred stock* is a security that has some of the characteristics of common stock and some of those of bonds. It's often referred to as a *hybrid* of the two—that is, a cross between common stock and bonds.

**Cumulative voting** gives minority interests a chance at some representation on the board.

Common stockholders are **last in line** to receive income or assets, and so bear **more risk** than other investors do. But their **residual** interest is large when the firm does well.

Preferred stock pays a constant dividend forever. When a share is initially issued, two things are specified: the initial selling price (in the primary market) and the dividend. The ratio between the two reflects the current return on investments of similar risk, the market interest rate.

For example, if the interest rate is 10% and a company wants to issue preferred shares at \$100 each, it would offer a dividend of \$10. This would be referred to as a \$10 preferred issue rather than a 10% preferred issue.

You can think of the 10% rate as being similar to the coupon rate on a bond. The preferred's initial selling price (issue price) is conceptually similar to a bond's face value. Preferred stock is generally issued at prices of \$25, \$50, and \$100.

It's important to notice that preferred stock carries no provision for the return of capital to the investor. That is, the issuing company never has to pay the initial selling price back.

## VALUATION OF PREFERRED STOCK

An investor who purchases a share of preferred stock receives a constant dividend forever. Because all securities are worth the present value of their future cash flows, a share of preferred is worth the present value of that infinitely long stream of dividend payments.

In Chapter 6 we said that a constant stream of payments stretching into the indefinite future is a *perpetuity* (page 253). We also learned a simple formula to calculate a perpetuity's present value, which we'll repeat here for convenience.

$$(6.24) \quad PV_p = \frac{PMT}{k}$$

We'll use this basic equation for preferred stock, but will change the variable names to more appropriately reflect the application. The perpetuity's payment (PMT) is the preferred dividend, which we'll call  $D_p$ . The present value of the perpetuity ( $PV_p$ ) must equal the security's price, which we'll call  $P_p$ . The interest rate will remain  $k$ . Then the expression for the price of a preferred share is

$$(8.13) \quad P_p = \frac{D_p}{k}$$

Notice that the valuation of a preferred share is conceptually identical to that of a zero growth common share discussed earlier in this chapter (page 336).

Like bonds, preferred stock is issued to yield approximately the current rate of interest. When interest rates change, preferred shares have to offer competitive yields to new secondary market buyers. This is accomplished through price changes.

Prices of preferred stocks, like those of bonds, move inversely with interest rates. However, calculating new preferred prices is much easier than calculating bond prices. We simply insert the new interest rate into equation 8.13 and solve for  $P_p$ .

**Preferred stock** pays a constant dividend and is valued as a **perpetuity**.

### Example 8.6

Roman Industries's \$6 preferred originally sold for \$50. Interest rates on similar issues are now 9%. What should Roman's preferred sell for today?

**SOLUTION:** Just substitute the new market interest rate into equation 8.13 for today's price.

$$P_p = \frac{D_p}{k} = \frac{\$6.00}{.09} = \$66.67$$

Notice that the original yield on the issue was ( $\$6/\$50 =$ ) 12%. Because the interest rate dropped from 12% to 9%, we know the price has to be above its original value of \$50. This gives a reasonableness check on our answer.

## CHARACTERISTICS OF PREFERRED STOCK

As a security, preferred stock has some unique characteristics relative to traditional debt and equity. We'll summarize a few issues.

### The Cumulative Feature

Nearly all preferred stock comes with a **cumulative feature** designed to enhance its safety for investors. The cumulative feature generally states that if preferred dividends are passed (not paid) in any year or series of years, no common dividends can be paid until the preferred dividends in arrears are caught up.

For example, if a firm gets into financial trouble and doesn't pay dividends on a \$5 preferred for three years, no common dividends can be paid until each preferred shareholder has received the cumulative total of \$15 per share.

### Comparing Preferred Stock with Common Stock and Bonds

Some of the features of preferred stock are like those of bonds, while some are more like those of common stock. Some are in between. Let's consider a few specifics.

#### Payments to Investors

The fact that preferred dividends are constant and don't increase even if the company grows makes them similar to the constant interest payments of a bond. They're unlike the dividends on common stock, which are usually expected to grow with the firm.

#### Maturity and Return of Principal

A bond has a maturity date on which the principal is returned. Preferred stock has no maturity, and never returns principal. In that respect it's like common stock, which never returns principal either.

#### Assurance of Payment

Interest must be paid or bondholders can force a company into bankruptcy. Common stock dividends can be passed indefinitely. Preferred dividends can be passed, but are subject to a cumulative feature. In this respect it is somewhere between bonds and common stock.

#### Priority in Bankruptcy

In the event of bankruptcy, bondholders have a claim on the company's assets to the extent of the unpaid principal of the bonds. Common stockholders are entitled only to what's left after all other claimants have been paid. Preferred stockholders are again in between. They have a claim in the amount of the original selling price of the stock, but it is subordinate to the claims of all bondholders. That is, it comes before the interests of common stockholders but after those of bondholders.

#### Voting Rights

Common stockholders have voting rights, while preferred stockholders do not. In that respect, preferred stock is like bonds.

Common dividends can't be paid unless the dividends on **cumulative preferred** are current.

The features of **preferred stock** allow it to be characterized as a **cross between common stock and bonds**.

### Tax Deductibility of Payments to Investors

Interest is tax deductible to the paying company, while dividends, common or preferred, are not. In this respect, preferred stock is very much equity.

Preferred stock is legally equity, but from what we've just said it's clearly more like debt in many ways. For that reason, it's generally treated separately in financial analysis.

### The Order of Risk

The features we've been talking about create an ordering of risk associated with the three securities. Bonds are the safest, common stock is the most risky, and preferred is in the middle. The compensation for the risk in common stock is that the return—through dividend increases and price appreciation—can be very high if the company does exceptionally well. That possibility doesn't exist with either of the other two.

The name “preferred” stock comes from the idea that of the two types of equity, you'd rather have preferred stock if the firm does poorly or fails.

### Taxes and Preferred Stock Investors

The U.S. tax code treats preferred dividends just like common dividends in that they're not tax deductible to the company paying them. That makes preferred stock a relatively expensive source of financing.

Like common dividends, preferred dividends received by another corporation are 70% or more exempt from taxation. (See Chapter 2, page 51.) This partial tax exemption coupled with preferred stock's relatively low risk makes it especially attractive to some institutional investors. Hence, those investors bid up preferred prices until they're not attractive to individual investors who don't have the tax exemption. The result is that not many *people* invest in preferred stock.

## SECURITIES ANALYSIS

Valuation is part of a broader process aimed at selecting investments known as **securities analysis**. The term is applied to both stocks and bonds, but most of the activity relates to selecting stocks. There are two basic approaches to analysis; we'll briefly describe each.

### Fundamental Analysis

**Fundamental analysis** involves doing research to discover everything possible about a firm, its business, and its industry (the firm's fundamentals). Once analysts become expert in a company's field, they forecast its sales and expenses over the coming years. From that they project earnings and then a stream of dividends based on the firm's stated or implied dividend policy. The forecast dividend stream is used as input to the valuation models we've been discussing.

The Thomson One database provided with this text is a powerful tool in fundamental analysis.

### Technical Analysis

**Technical analysts** take a different approach. Technicians believe market forces dictate prices and, more importantly, price movements. They also believe movement patterns tend to repeat themselves over time. By studying past price changes, technicians believe they can recognize patterns that precede major up or down movements in the prices of individual stocks.

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**Securities analysis** is the art and science of selecting investments.

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**Fundamental analysis** looks at a company and its business to forecast value.

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**Technical analysis** bases value on the pattern of past prices and volumes.

Technicians prepare elaborate charts displaying the prices and volumes<sup>4</sup> of virtually all stocks traded. These are examined in an effort to discern patterns that precede major moves. Because of this technique, technical analysts are also called **chartists**.

Technicians feel one doesn't have to know *why* a firm's stock has value in terms of underlying cash flows. Rather, they believe it's enough to accept that it does have value, and rely on predictable market phenomena to make investment decisions.

**http://**

Microsoft Money Central at <http://moneycentral.msn.com/home.asp> offers access to a wealth of stock data.

## Fundamentalists versus Technicians

The two schools of thought are rather vocally opposed to one another, although many people use ideas from both camps. Scholars are almost universally fundamentalists. Nevertheless, the technical school of thought has a significant following.

A number of statistical studies have been done in attempts to prove or disprove the validity of technical analysis once and for all. To date no one has definitely proven anything to the satisfaction of the other side.

## The Efficient Market Hypothesis (EMH)

The *efficient market hypothesis* (EMH) pertains to information flows within financial markets in the United States. It says that financial markets are efficient in that new information is disseminated with lightning speed.

The theory asserts that information moves so fast around the thousands of analysts, brokers, and investors who make up the stock market that prices adjust to new information virtually immediately. In other words, when some new knowledge about a stock becomes available, it is analyzed and disseminated so fast that the market price adjusts to reflect the information in a matter of hours or less.

For example, suppose a pharmaceutical company announced that it had discovered a cure for cancer. That would certainly raise the price of the firm's stock. The EMH says that the price rise will happen immediately, because analysts will be on the phone right away telling client investors the news, and they'll bid the price up as fast as they can.

The implication is that at any time, all available information is already reflected in stock prices, and studying historical patterns of price movement can't consistently do an investor any good. Hence, the EMH is a direct refutation of the validity of technical analysis.

However, the EMH implies that we won't find many bargains using fundamental analysis and valuation models either. That's because an army of professionals is doing fundamental analysis all the time, and they will have already discovered and disseminated anything an individual can figure out.

The validity of the EMH is subject to dispute. It will probably never be proven to be either right or wrong. At this point in your study, you should just be aware of its existence and have a basic grasp of what it says.

## OPTIONS AND WARRANTS

Options are securities that make it possible to invest in stocks without actually holding shares. Warrants are similar but less common. We'll discuss options in some detail and then briefly describe warrants.

An option is a contract that gives one party a *temporary* right to buy an asset from the other at a fixed price. (Alternatively, an option contract may grant the right to

The **efficient market hypothesis** says information moves so rapidly in financial markets that price changes occur immediately, so it's impossible to **consistently** beat the market to bargains.

Options and warrants make it possible to **invest** in stocks **without holding shares**.

4. "Volume" refers to the number of shares traded in a period. A price change at a low volume of trading isn't generally as significant as the same change accompanied by a higher volume.

An option grants a **temporary right to buy or sell** an asset at a fixed price.

Option holders can **speculate** on asset **price changes** without holding the asset.

**Calls** are options to **buy** stocks. **Puts** are options to **sell**.

The value of a **derivative security** is based on that of another **underlying security**.

**Leverage amplifies** the **return** on an investment.

An option to **buy** a stock at a **strike price** sells for the **option price**.

sell.) It's a good idea to understand a little about the general concept before we get into financial options.

## OPTIONS IN GENERAL

Options are used in business all the time. An option to buy real estate will familiarize us with the way they work and lead us into options on stocks. Suppose a company is interested in building a new factory and has identified a desirable site but will need six months to make a final decision on the project. How can it hold onto the right to buy the land without making a commitment now?

The solution can be an option contract granting the firm the right to buy the site within six months at a stipulated price. That locks in the land's availability and price but leaves management free to not make the purchase. Of course the company has to pay the landowner for that privilege, but this cost is a small fraction of the value of the real estate. The option is a purchase contract that's suspended at the discretion of the buyer for a limited time after which it expires. Now consider the following possibility that will help us move into financial options.

Suppose after almost six months, the firm decides it's not going to build the factory but notices that the price of real estate has gone up 30%. What should it do?

Clearly, it should exercise the option and sell the land for a profit, which will be made *without owning the land* while it appreciated. This is possible with any asset on which options are sold. The big advantage of options is that they cost far less than the underlying assets. That advantage is what financial options are all about.

## STOCK OPTIONS

Options on stock are conceptually similar to real estate options, but they aren't purchased to acquire stock. Rather, they're bought to speculate on price movement. Stock options are themselves securities and can be traded in financial markets. An option to *buy* a stock is known as a **call option** or just a *call*. Options to sell real assets are unusual, but options to sell stock are common. They're known as **put options** or just *puts*. We'll discuss calls and puts separately in the sections that follow.

Options are the most important example of a class of financial assets known as **derivative securities**. A derivative is so named because it derives its value from the price of another *underlying security*, in this case the optioned stock.

Investors are interested in stock options because they provide speculative leverage, a term applied to any technique that amplifies the return on an investment. Option leverage comes from the fact that the return on an investment in options can be many times larger than the return on the underlying stock. We'll describe how that works shortly.

## CALL OPTIONS

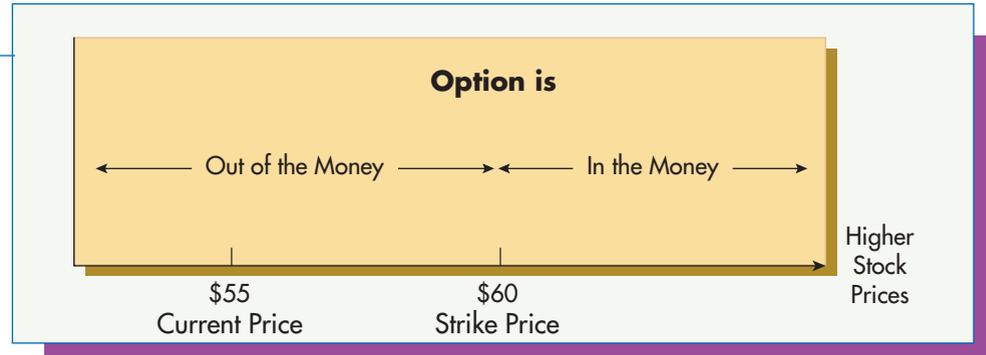
Imagine that a stock is selling for \$55 and someone offers you a contract under which he agrees to sell you a share for \$60 anytime during the next three months. This is a basic call option. It grants its owner the right to *buy* a share at a fixed price for a specified period, typically three, six, or nine months. At the end of that time, the option expires and can no longer be *exercised*.

The price the option holder pays for the contract is the **option price**, which we'll call  $P_{Op}$ . It's always a great deal less than the stock's price. An option on a stock worth \$55 might sell for \$2 or \$3.

This idea is portrayed graphically in Figure 8.3. The stock's current price is called just that, but the \$60 is known as the option's **strike price**, **striking price**, or **exercise price**.

Figure 8.3

## Basic Call Option Concepts



Ask yourself the following questions. Would you pay anything for this option contract? Why? And if you would pay for the deal, what factors would make you pay more or less? Think about these questions before reading on.

An investor might be willing to buy this option, because there's a chance the stock's price will exceed \$60 within the next three months. If that happens, an option owner can buy at \$60 and immediately sell for the higher market price. For example, suppose an investor paid \$1 for the option and the stock's price went to \$63. She would exercise at \$60 and immediately sell for \$63, making the \$3 difference less the \$1 paid for the option contract.

Notice that the \$2 profit is a 200% return on the \$1 investment in the option. But also notice that if the stock's price doesn't pass \$60 in three months, the option expires and the \$1 is lost. That's a 100% loss on the investment.

Two factors make options more or less appealing. An option on a volatile stock is worth more than one on a stable issue, because a volatile stock's price is more likely to go above the strike price in the allotted time. People also pay more for options with more time until expiration, because that gives the stock's price more time to move past the strike price.

### The Call Option Writer

There are two parties to an option contract, a buyer and a seller. Don't confuse buying and selling the option contract with buying and selling the optioned stock. Until now we've focused on option buyers who have the right to buy stock at the strike price.

Terminology with respect to option sellers can be a little tricky. The first person to sell an option contract is the person who creates it by agreeing to sell the stock at the strike price. He is said to *write* the option. Once it's written, the option contract becomes a security and the writer sells it to the first buyer who may sell it to someone else later on. No matter how many times the option is sold, the writer remains bound by the contract to sell the underlying stock to the current option owner at the strike price if she exercises.

A call option writer hopes the underlying stock's price will remain stable. If it does, he will have a gain from the receipt of the option price. We'll talk about writing options in more detail later.

### INTRINSIC VALUE

If a stock's current price is below the strike price of a call option, as we've shown in Figure 8.3, we say the option is *out of the money*. If the stock's price is above the strike price, we say the option is *in the money*.

Option **originators** are said to **write** options.

**Intrinsic value** is the **difference** between the stock's **current price** and the **strike price**.

When an option is in the money, it has an immediate minimum value that doesn't depend on the underlying stock's price moving higher. We call that the option's *intrinsic value*. For example, suppose the stock underlying the option in Figure 8.3 is selling for \$65. Then the option to buy at \$60 must be worth at least \$5, because an option owner can exercise at \$60 and immediately sell at \$65 for a \$5 gain (less the option price).

In general, a call option's intrinsic value is the difference between the underlying stock's current price and the option's strike price. The relationship is reflected in equation 8.14.

$$(8.14) \quad V_{IC} = P_S - P_{Strk}$$

where  $V_{IC}$  = Intrinsic value of a Call option,

$P_S$  = current price of the underlying stock, and

$P_{Strk}$  = the option's strike price.

$V_{IC}$  is simply zero when the stock's price is less than the strike price (i.e., when the option is out of the money and  $P_S < P_{Strk}$ ).

It's apparent from equation 8.14 that the intrinsic value of an option is a linear function of the price of the underlying stock,  $P_S$ . A graph of the value of an option with a \$60 strike price, called *an option at \$60*, is shown in Figure 8.4. Notice that the intrinsic value is horizontal at zero to the left of the strike price and slopes upward to the right of the strike price.

**Figure 8.4**

**The Value of a Call Option**

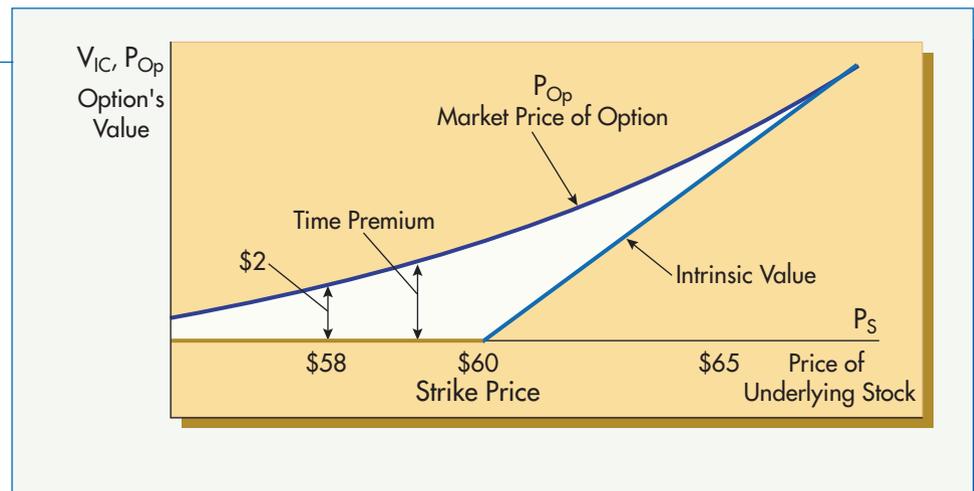


Figure 8.4 also shows the actual market price of the option,  $P_{Op}$ , the curved line lying above the intrinsic value. It's important to notice that the option always sells for a price that's at or above its intrinsic value. The difference between the intrinsic value and the option price is called the option's **time premium**, the lighter space in Figure 8.4.

Investors are willing to pay premiums over intrinsic value for options, because of the chance that they will profit if the underlying stock's price goes higher. The exact

shape of the graph of a particular option's premium depends on the stock's volatility, the time until expiration, and the attitude of the market about the underlying company. The general shape is shown in Figure 8.4. The premium is generally largest when a stock's price is near but a little below the option's strike price; it diminishes as the stock price rises.

This characteristic shape is a result of the way the leverage offered by the option varies with the price of the underlying stock. It's important to understand why that shape takes the form it does.

## OPTIONS AND LEVERAGE

Financial leverage is a term used to describe any technique that amplifies return on investment (ROI). For example, suppose a traditional stock investment results in a 10% return. Then a leveraged investment in the same stock might result in a 40% or 50% return over the same period. Unfortunately, leverage works on losses too, so if the stock's return turned out to be  $-10\%$ , the leveraged investment would have produced  $-40\%$  or  $-50\%$ .

Options represent one of a number of leveraging techniques. We'll refer to Figure 8.4 to see how they work. In the diagram, imagine that the underlying stock is trading at \$58 and that the time premium on a call option is \$2.<sup>5</sup> (The option price is also \$2 because its intrinsic value is zero at that stock price.) Now imagine that the stock's price increases to \$65, the option is exercised, and the optioned share is sold. We'll ignore brokerage commissions for simplicity.

First let's look at an investment in the stock over the same period. It would have been purchased at \$58 and sold at \$65 for a \$7 profit and a return on investment (ROI) of

$$\text{ROI} = \frac{\$7}{\$58} = 12.1\%$$

Now consider investing in the option. The buyer initially paid \$2 for the option. Then he exercised, buying the underlying stock at \$60 and immediately selling at \$65 for a \$5 gain, which was reduced by the \$2 option price. Hence, the option buyer's net gain is \$3. *But* he had only the \$2 option price tied up in the transaction. Hence, his ROI is

$$\text{ROI} = \frac{\$3}{\$2} = 150\%$$

Notice the tremendous power of the option to multiply the investor's return. The option's ROI is  $(150/12.1=)$  12 times that of a straight stock investment. The potential for this kind of return contributes a great deal to the option's value when the stock's price is just below the strike price.

The option isn't quite as good a deal when the stock is trading above the strike price. There are two reasons for that. The stock price has to rise higher to make a given profit, and the buyer has to pay a positive intrinsic value in addition to the time premium for the option. That makes his investment larger, which decreases the leverage effect.

5. We're just assuming this premium for illustrative purposes. The actual premium would depend on factors such as the underlying stock's volatility and the time until expiration as well as the demand for options at the time. A reasonable value is \$2.

**Leverage amplifies return** on investment.

**Options** offer a great deal of leverage.

These factors make the time premium diminish as the stock's price increases over the strike price. A numerical example is provided in the footnote.<sup>6</sup>

The time premium is smaller farther to the left of the strike price in Figure 8.4 simply because it becomes less likely that the stock will ever move into the money.

### Options That Expire

It's important to keep in mind that options are exercisable only over limited periods at the end of which they expire and become worthless. That makes option investing very risky. For example, if an option is purchased out of the money and the underlying stock's value never exceeds the strike price, the option expires and the buyer loses the price paid for it. It's important to realize that's a 100% loss.

If an option is purchased at a price that includes a positive intrinsic value (to the right of \$60 in Figure 8.4) and the underlying stock goes down in value, the option buyer's loss at expiration is the time premium paid plus the decrease in intrinsic value. That will only be a 100% loss if the stock's price declines all the way to the strike price.

As its expiration date approaches, any option's time premium shrinks to virtually zero as the time remaining for the stock's price to change diminishes. Notice that anyone owning an option with a positive intrinsic value just before expiration must act quickly to avoid losing that value.

## TRADING IN OPTIONS

Up until now, we've spoken as if buyers always hold options until they are either exercised or expire. In fact, that's not the case. Options can be bought and sold between investors at any time during their lives. Options on selected stocks are traded on a number of exchanges throughout the country. The largest, oldest, and best known is the Chicago Board Options Exchange, abbreviated CBOE.

### Price Volatility in the Options Market

Option prices move up and down with the prices of the underlying securities, but the relative movement is much greater for options. For example, in Figure 8.4 we said the option might sell for \$2 when the underlying stock's price is \$58. Now suppose the stock's price goes up to \$65 while there's still some time until expiration. Observe from the graph that the option sells for a price which includes its intrinsic value of  $(\$65 - \$60 =)$  \$5 and a smaller time premium. Assume that premium is \$1 (not shown), so the option's price is \$6.

The stock's \$7 price movement from \$58 to \$65 is a 12.1% increase, but it has driven the option's price to triple in value from \$2 to \$6 (a 200% increase). As a result of this phenomenon, prices in options markets are extremely volatile and fast moving.

6. Suppose the premium is \$1 when the stock's price is \$65. That means an option buyer pays the intrinsic value of  $(\$65 - \$60 =)$  \$5 plus the \$1 premium, or \$6 for the option. Then suppose the stock's price goes up by another \$7 to \$72.

First consider the return on an investment in the stock. It would be purchased at \$65 and sold at \$72 for a \$7 profit and a return on investment (ROI) of

$$\text{ROI} = \$7/\$65 = 10.8\%$$

Now consider the return on the option. The buyer exercises at \$60 and sells his share at \$72 for a \$12 gain. But the option cost \$6, so his profit on the whole transaction is  $(\$12 - \$6 =)$  \$6. And his ROI is

$$\text{ROI} = \$6/\$6 = 100\%$$

That's considerably less than the 150% generated by the same price movement from a lower starting point. As a result, the option is less attractive and the premium is lower.

Options become **worthless** when they **expire**.

The largest options exchange is the **Chicago Board Options Exchange (CBOE)**.

Option **prices move** very **rapidly**.

Options are **rarely exercised** until immediately before **expiration**.

Speculating in **options** involves a good **chance** of **total loss**.

An option is written **covered** when the **writer owns** the optioned stock.

An option is written **naked** when the **writer does not own** the optioned stock.

## Options are Rarely Exercised before Expiration

In the situation just described, suppose the option owner believes further increases in the underlying stock's price are unlikely and wants to close out his investment even though there's a good deal of time left until expiration. In that case, virtually all traders would sell the option to another investor rather than exercise it. That's because exercising brings only  $(\$65 - \$60 =)$  \$5, which is less than the \$6 option price.

Exercising requires throwing away whatever value is in the time premium, in this case \$1. As a result, options are rarely exercised before expiration when the time premium shrinks to zero.

## The Downside and Risk

It's important to think about the upside and downside of option trading at the same time. There's a chance of a very high return through leverage, but there's also a good chance of a total loss. That's another way of saying leverage works both ways, amplifying losses as well as gains. It's a big mistake to get so caught up in the potential gains that you lose sight of the losses that are also possible.

## WRITING OPTIONS

Investors can issue or *write* option contracts which are bought by other investors. People write options for the premium income received when they're sold. But option writers give up whatever profits their buyers make. Option writers and buyers essentially take opposite sides of bets on which way underlying stock prices will move.

Options are written either covered or naked. In a *covered* option, the writer owns the underlying stock at the time the option is written. If the stock's price goes up and a call option buyer exercises, the writer must sell at the strike price. The option writer isn't out any additional cash, but he missed out on the price appreciation he would have had if he hadn't written the option.

For example, suppose an investor has a share of stock purchased some time ago for \$40 that's currently selling for \$55, and he writes a call option on it at a striking price of \$60. Then suppose the stock goes to \$70 and the buyer exercises. The investor must sell the share for \$60 even though it's now worth \$70. In a sense, he has had an "opportunity loss" of \$10 by not being able to sell at \$70. In reality, he realizes a gain of \$20 plus the option price over his original \$40 cost.

Someone who writes an option *naked* doesn't own the underlying stock at the time she writes the option. She therefore faces more risk. In the situation described in the last paragraph, if the option had been written naked, the writer would have had to buy a share at \$70 and sell it at \$60, losing \$10 less the option price received earlier.

**Example 8.7** The following information refers to a three-month call option on the stock of Oxbow Inc.

Price of underlying stock	\$30
Strike price of three-month call	25
Market price of the option	8

- What is the intrinsic value of the option?
- What is the option's time premium at this price?
- Is the call in or out of the money?
- If an investor writes and sells a covered call option, acquiring the covering stock now, how much has he invested?
- What is the most the buyer of the call can lose?

f. What is the most the writer of the call naked can lose?

Just before the option's expiration, Oxbow is selling for \$32.

g. What is the profit or loss from buying the call?

h. What is the profit or loss from writing the call naked?

i. What is the profit or loss from writing the call covered if the covering stock was acquired at the time the call was written?

**SOLUTION:**

a. Write equation 8.14 and substitute.

$$V_{IC} = P_S - P_{Strk}$$

$$V_{IC} = \$30 - \$25 = \$5$$

b. The time premium is the difference between the option's price and its intrinsic value.

$$\text{time premium} = P_{Op} - V_{IC}$$

$$= \$8 - \$5 = \$3$$

c. The call option is in the money because it has a positive intrinsic value.

d. To establish a covered call, the investor buys the stock at its market price and sells an option immediately. The option's price therefore offsets the investment in the stock.

$$\text{investment} = \text{price of stock} - \text{price of call option}$$

$$= P_S - P_{Op}$$

$$= \$30 - \$8$$

$$= \$22$$

e. The most any option buyer can lose is the option price, \$8 in this case.

f. A writer of a call naked has to buy the stock on the open market if his buyer exercises the option. In theory, the stock can rise to any price, so the naked call writer can lose an infinite amount. In practice, a prudent investor would limit her losses by purchasing the share when it started to move up.

g. The call owner exercises the option paying the strike price and simultaneously sells the share at market price. Any resulting gain (loss) is reduced (made worse) by the price paid for the call.

	Market price of stock at time of exercise		\$32
Less:	Strike price	\$(25)	
	Price of option	<u>(8)</u>	<u>(33)</u>
Loss			\$ (1)

h. An investor who wrote a call naked buys the stock at market price when the option is exercised and sells at the strike price. The result is improved by the price received for the option.

	Market price of stock at time of exercise		\$(32)
Plus:	Strike price	\$25	
	Price of option	<u>8</u>	<u>33</u>
Gain			\$ 1

i. An investor who wrote a call covered bought the stock at market price when the option was written and sells it at the strike price. The result is improved by the price received for the option.

	Market price of stock at time of exercise		\$(30)
Plus:	Strike price	\$25	
	Price of option	<u>8</u>	<u>33</u>
Gain			\$ 3

A **put** is an option to **sell**.

A **put buyer profits** if the optioned stock's **price falls**.

## PUT OPTIONS

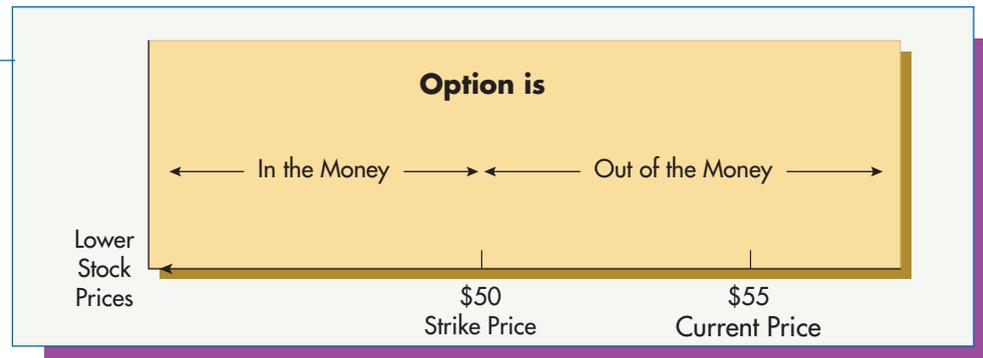
A *put option*, or just a *put*, is an option to sell at a specified price. Investors buy puts if they think the price of the underlying security is going to fall.

For example, suppose a stock currently has a market price of \$55 and a put option is available to sell at a strike price of \$50. The option buyer makes money if the stock's price drops to \$45 by buying a share at that price and selling it to the option writer for \$50.

Put options are in the money when the stock is selling below the strike price, \$50 in this case. This idea is shown graphically in Figure 8.5.

**Figure 8.5**

### Basic Put Option Concepts



The intrinsic value of a put is the difference between the strike price and the current price of the stock when that difference is a positive number; otherwise, it is zero. This relationship is expressed in equation 8.15.

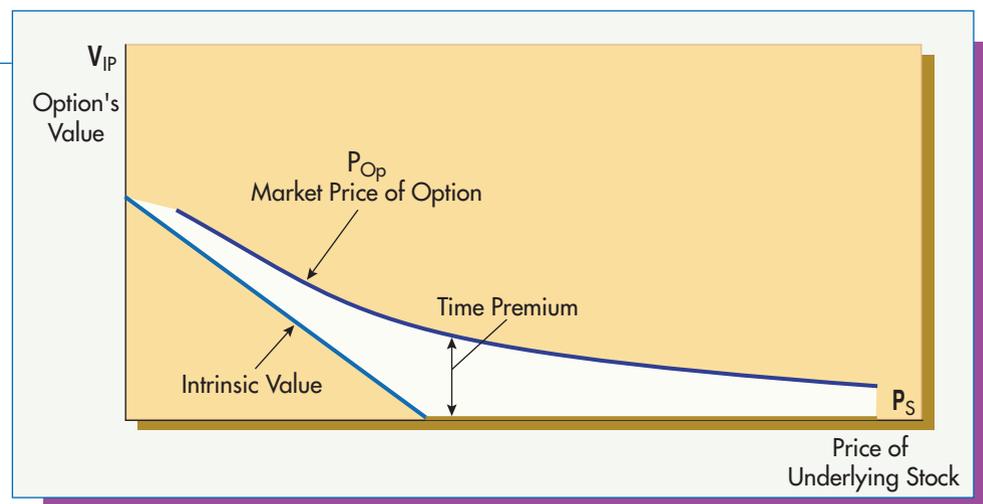
$$(8.15) \quad V_{IP} = P_{Strk} - P_S$$

where  $V_{IP}$  = Intrinsic value of a Put option,  
 $P_S$  = current price of the underlying stock, and  
 $P_{Strk}$  = the option's strike price.

When the stock is trading above the strike price, the intrinsic value is just zero (i.e., when the option is out of the money and  $P_S > P_{Strk}$ ). As with call options, puts sell for a time premium over their intrinsic values. This idea is shown in Figure 8.6.

**Figure 8.6**

### The Value of a Put Option



## OPTION PRICING MODELS

When we discussed stocks earlier in this chapter and bonds in Chapter 7, we studied pricing models that allowed us to predict the prices those securities should command in financial markets. (See the bond equation on page 276 and the Gordon model on page 335.) Options, like stocks and bonds, are traded securities, so it's logical to ask if a similar pricing model exists for them. The modeling problem is more difficult for options than for stocks and bonds, because it's hard to express an option's value as the present value of a stream of future cash flows.

A viable option pricing model was developed some years ago by two well-known financial scholars, Fischer Black and Myron Scholes.<sup>7</sup> The **Black-Scholes Option Pricing Model** has achieved significant popularity despite the fact that it is extremely complex mathematically. This is possible because calculators and spreadsheets have been programmed to carry out the complex math after being given a few straightforward inputs. As a result, real-world practitioners use the model frequently.

The Black-Scholes model determines option prices as a function of the following variables:

- Underlying stock's current price
- Option's strike price
- Time remaining until the option's expiration
- Volatility of the market price of the underlying stock
- Risk-free interest rate

At this point in your study, you should just be aware that the Black-Scholes model exists and that it gives reasonable but not precisely accurate results similar to those of stock pricing models.

## WARRANTS

It's important to notice that the options we've been discussing up until now are strictly secondary market phenomena (see page 172). That is, they're traded *between investors*, and the companies that issue the underlying stocks are not involved. Specifically, those companies don't get any money when options are written or exercised.

Warrants are similar to call options but are issued by the underlying companies themselves. When a warrant is exercised, the company issues new stock in return for the exercise price. Warrants are therefore primary market instruments.

Warrants are like call options in that they give their owners the right to buy stock at a designated price over a specified period. They differ in that the time period is generally much longer, typically several years.

Warrants are usually issued in conjunction with other financing instruments as "sweeteners" to make the primary security more attractive. For example, suppose Jones Inc. wants to borrow, but isn't in good financial condition, so lenders (bond buyers) have rejected its bonds. Assume Jones has good long-term prospects, and its stock is selling for \$40.

Under these conditions, lenders may be induced to take Jones's bonds if the firm *attaches* one or more warrants to each bond giving the owner the right to buy a share

Option prices can be estimated using the **Black-Scholes Option Pricing Model**.

Options are **secondary market** activities. The underlying **companies** are **not involved**.

**Warrants** are like options but are **issued by companies** which receive **equity** at exercise.

**Warrants** are **sweeteners attached** to other securities.

7. "The Pricing of Options and Corporate Liabilities," *Journal of Political Economy* 81 (May–June 1973): pp. 637–654.

at \$50 within the next five years. The warrants provide an incentive to buy the bonds if people think the stock is likely to go over \$50 before five years have passed.

Warrants can generally be *detached* and sold independently at a market value of their own. That effectively reduces the price of the bonds and increases their yield to the investor. Alternatively, bondholders can keep the warrants and exercise them for a quick gain if the stock's price rises above \$50.

Notice that if the warrants are exercised, the company receives an equity infusion based on a price of \$50 rather than the higher market price. The bonds are unaffected by the exercise of the warrants.

## EMPLOYEE STOCK OPTIONS

For many years, American companies have given certain employees stock options as part of their compensation. Employee options are actually more like warrants than traded options because they don't expire for several years and strike prices are always set well above current stock prices. Employees who receive options generally get less in salary than they otherwise would.

Workers like being paid with options if the firm has a bright future, because even a few options can be worth more than the salary forgone. For example, many ordinary employees at high-tech firms like Microsoft became millionaires during the 1980s and 1990s because of employee stock options.

Companies favor paying people with options because they don't cost anything in cash when issued. Since employees who receive options get lower salaries, the practice improves financial results by lowering payroll costs. Beyond that, supporters argue that the practice has an important role in keeping the United States a leader in innovation. They maintain that the chance of getting rich through options attracts the best and brightest people with innovative ideas to new companies. Without options, struggling new firms couldn't afford that kind of talent and would not prosper.

Employee options have a dilutive effect (see pages 295–298), on the interests of other shareholders, but historically most investors have been willing to accept that.

### The Executive Stock Option Problem

Recipients of the biggest employee stock options are senior executives. In larger companies, pay packages of top people typically include salary in the millions of dollars and options that can generate income in the tens of millions of dollars.

In recent years, a great deal of criticism has been leveled at option-rich packages for top management. It is argued that such pay structures give executives too much incentive to maximize stock prices. In other words, since the personal wealth of CEOs and CFOs is directly tied to stock price through options, they may be tempted to take extreme measures to keep prices up at the expense of others. We discussed this idea in detail in Chapter 5 when we studied corporate governance and the Sarbanes-Oxley Act. We'll recap those ideas here for readers who may not have covered that section.

To understand this danger, we have to recognize that financial results drive stock prices and that top executives can manipulate financial results. The situation is a classic conflict of interest in that someone in control of a system that determines his own pay has an incentive to manipulate that system to the detriment of others. In other words, there are a number of unethical ways to make financial results seem better than they are, and the decision to use them rests with senior executives.

If the methods are used, overstated financial results are interpreted favorably by investors who bid stock prices up. Stocks remain overvalued until the investment community discovers what has been going on. Then prices crash, rapidly destroying value

**Warrants** are generally **detachable** and traded independently.

**Stock options** are often used **instead** of a portion of **salary**.

Employee stock options **don't cost the company anything in cash** when issued.

**Senior executives** are the **biggest recipients** of employee **stock options**.

**Stock options** provide an **incentive** for executives to **misstate financial statements** to keep **stock prices up**.

for shareholders. But by then, high-flying executives have exercised their options, sold the shares, and pocketed enormous sums of cash. Essentially, executive teams get rich on money contributed by investors who were deceived into paying too much for stock.

Pension funds are an even more startling problem. Company-controlled retirement plans are often heavily invested in the company's own stock, the value of which evaporates when deceptive reporting is uncovered. The result is that top executives effectively steal their employees' retirement savings.

For years, the investing community wasn't overly concerned about this deception, because everyone assumed auditors would keep financial results reasonably accurate. In other words, people knew overstatements existed but didn't believe they were excessive.

But in the early 2000s, it became apparent that auditors couldn't always be counted on to police corporate financial reporting, because they were caught up in a conflict of interest of their own. Since auditors are paid by the companies they audit, they're likely to accede to the wishes of the senior executives they're supposed to be watching. They do that by interpreting accounting rules liberally and signing off on financial statements that are deceptive and likely to mislead investors.

In the early 2000s, the stock prices of several major corporations collapsed when the investing community learned that their financial statements contained major misrepresentations. The best-known cases were Enron, a leading player in energy; WorldCom, the telecommunications giant that owned MCI; and Tyco, a conglomerate that participates in a wide variety of businesses. In addition, Arthur Andersen, Enron's auditor and one of the world's largest accounting firms, went out of business as a result of its role in the Enron debacle.

These collapses led to a loss of confidence in corporate management by the investing public. Option-based compensation wasn't the only problem uncovered, but many feel the system sets up a climate that encourages management to focus on short-term financial results and inevitably leads to less than honest reporting.

The scandal led to a major review of financial reporting and auditing procedures by the accounting profession as well as congressional legislation aimed at punishing knowing deception by senior executives. A major issue within the overhaul was a requirement that companies recognize employee stock options as expenses at the time they're issued even though no cash is actually disbursed. Doing that makes giving executives overly generous option packages less attractive to issuing companies, because expense recognized on the income statement lowers profits, and that generally has an adverse effect on investor enthusiasm.

Expensing options also presents a technical valuation problem, because at the time of issue, no one knows how much an option will eventually be worth. That's because it's impossible to say how high the price of the underlying stock will rise. Hence it's hard to know how much to charge to expense when an option is granted.

Nevertheless, as we've learned in this section, options do have market value when they're issued even if the underlying stock is trading below the striking price. Hence it's quite reasonable, and definitely conservative, to recognize some expense at that time. Further, the valuation problem can be handled, at least approximately, using sophisticated option pricing techniques such as the Black-Scholes model we discussed earlier (page 358).

### **The Accounting Profession's Response to Expensing Options Upon Issue**

Accounting rules and conventions are created and disseminated by the Financial Accounting Standards Board (FASB). That body issued a statement regarding the

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**Misstatements** of financial results **uncovered** in the early 2000s **undermined confidence** in the **honesty** of corporate **management**.

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The **executive stock option** system sets up a **conflict of interest** that can **lead to dishonest** reporting.

financial treatment of options given as compensation in 1995. The statement was promulgated as FASB 123, and recommended that companies expense options. Unfortunately, the statement was vague on the method of calculating the amounts that should be expensed. It also left the decision on whether to expense up to individual companies. As might be expected, virtually no one chose to recognize expense when options were issued as a result of FASB 123.

The board revisited the question in response to the events of the early 2000s issuing a revised statement in 2004, FASB 123(R). The revision made expensing options mandatory for public companies beginning in 2005. It also gave more guidance on how to value them. The Black-Scholes model is still available but so are other slightly less involved techniques known as lattice models.

The high-tech companies that make liberal use of options as compensation argued vigorously against an expensing requirement right up until the time it was implemented. They claimed it would put them at a competitive disadvantage and drive venture capital out of the country. By mid 2006, however, the practice didn't seem to have had much effect on investors or the high-tech industry.<sup>8</sup>

## QUESTIONS

1. Discuss the nature of stock as an investment. Do most stockholders play large roles in the management of the firms in which they invest? Why or why not?
2. Compare and contrast the nature of cash flows stemming from an investment in stock with those coming from bonds.
3. Verbally rationalize the validity of a stock valuation model that doesn't contain a selling price as a source of cash flow to the investor. Give two independent arguments.
4. Why are growth rate models practical and convenient ways to look at stock valuation?
5. What is meant by normal growth? Contrast normal and super normal growth. How long can each last? Why?
6. Describe the approach to valuing a stock that is expected to grow at more than one rate in the future. Can there be more than two rates? What two things have to be true of the last rate?
7. Discuss the accuracy of stock valuation, and compare it with that of bond valuation.
8. Do stocks that don't pay dividends have value? Why?
9. Preferred stock is said to be a hybrid of common stock and bonds. Explain fully. Describe the cash flows associated with preferred and their valuation.
10. Discuss the relative riskiness of investment in bonds, common stock, and preferred stock.
11. Compare fundamental analysis and technical analysis. Which makes more sense to you?

8. Lee Gomes, "Tech Companies Give Stock-Options Value and Actually Survive," *The Wall Street Journal* (March 6, 2006), page B1.

12. What does the efficient market hypothesis say? What is its implication for stock analysis?
13. Options are more exciting than investing in the underlying stocks because they offer leverage. Explain this statement.
14. Is investing in options really investing, or is it more like gambling?

### BUSINESS ANALYSIS

1. Your cousin Charlie came into a large inheritance last year and invested the entire amount in the common stock of IBD Inc., a large computer company. Subsequently he's been very interested in the company and watches it closely. Recently the newspaper carried a story about major strategic changes at IBD, including massive layoffs and business realignments. Charlie was devastated. He doesn't understand how the firm could have made such changes without the knowledge or approval of its stockholders. Write a brief letter to Charlie explaining how things really work.

### PROBLEMS

1. Paul Dargis has analyzed five stocks and estimated the dividends they will pay next year as well as their prices at the end of the year. His projections are shown below.

Stock	Current Price	Projected Dividend	Projected Price
A	\$37.50	\$1.45	\$43.00
B	24.50	.90	26.50
C	57.80	2.10	63.50
D	74.35	None	81.00
E	64.80	3.15	63.00

Compute the dividend yield, capital gains yield, and total one-year return implied by Paul's estimates for each stock.

2. The stock of Sedly Inc. is expected to pay the following dividends.

	Year			
	1	2	3	4
Dividend	\$2.25	\$3.50	\$1.75	\$2.00

At the end of the fourth year its value is expected to be \$37.50. What should Sedly sell for today if the return on stocks of similar risk is 12%?

3. Fred Tibbits has made a detailed study of the denim clothing industry. He's particularly interested in a company called Denhart Fashions that makes stylish denim

apparel for children and teenagers. Fred has done a forecast of Denhart's earnings and looked at its dividend payment record. He's come to the conclusion that the firm will pay a dividend of \$5.00 for the next two years followed by a year of \$6.50. Fred's investment plan is to buy Denhart now, hold it for three years, and then sell. He thinks the price will be about \$75 when he sells. What is the most Fred should be willing to pay for a share of Denhart if he can earn 10% on investments of similar risk?

4. Mitech Corp. stock sold for \$8.50 per share 20 years ago and is currently selling for \$82.00. Based on past growth rate performance, what would you expect the stock's price to be in five years?
5. The Spinnaker Company has paid an annual dividend of \$2 per share for some time. Recently, however, the board of directors voted to grow the dividend by 6% per year from now on. What is the most you would be willing to pay for a share of Spinnaker if you expect a 10% return on your stock investments?
6. The Pancake Corporation recently paid a \$3 dividend and is expected to grow at 5% forever. Investors generally require an expected return of at least 9% before they'll buy stocks similar to those of Pancake.
  - a. What is Pancake's intrinsic value?
  - b. Is it a bargain if it's selling at \$76 a share?
7. Tyler Inc.'s most recent annual dividend was \$3.55 a share. The firm has been growing at a consistent 4% rate for several years, but analysts generally believe better times are ahead and future growth will be in the neighborhood of 5%. The stock is currently selling for \$75. Stocks similar to Tyler earn returns ranging from 8% to 10%.
  - a. Calculate values for a share of Tyler at interest rates of 8%, 9%, and 10%.
  - b. Do you think Tyler is a good investment for the long run—that is, for someone planning to hold onto it for 10 or more years?
  - c. Do you think it's a good investment for the short term? That is, should you buy it with the expectation of selling in a relatively short period, say a year or less?
  - d. Repeat the calculations in part (a) assuming that instead of rising, Tyler's growth rate (1) remains at 4% or (2) declines to 3%.
  - e. Comment on the range of prices that you've calculated in parts (a) and (d).
8. The Anderson Pipe Co. just paid an annual dividend of \$3.75 and is expected to grow at 8% for the foreseeable future. Harley Bevins generally demands a return of 9% when he invests in companies similar to Anderson.
  - a. What is the most Harley should be willing to pay for a share of Anderson?
  - b. Is your answer reasonable? What's going on here? What should Harley do with this result?
9. Cavanaugh Construction specializes in designing and building custom homes. Business has been excellent, and Cavanaugh projects a 10% growth rate for the foreseeable future. The company just paid a \$3.75 dividend. Comparable stocks are returning 11%.
  - a. What is the intrinsic value of Cavanaugh stock?
  - b. Does this seem reasonable? Why or why not?
  - c. If Cavanaugh's growth rate is only 8.5% and comparable stocks are really returning 12%, what is Cavanaugh's intrinsic value?
  - d. Do these relatively small changes in assumptions justify the change in the intrinsic value? Why or why not?

10. The Miller Milk Company has just come up with a new lactose-free dessert product for people who can't eat or drink ordinary dairy products. Management expects the new product to fuel sales growth at 30% for about two years. After that competitors will copy the idea and produce similar products, and growth will return to about 3%, which is normal for the dairy industry in the area. Miller recently paid an annual dividend of \$2.60, which will grow with the company. The return on stocks similar to Miller's is typically around 10%. What is the most you would pay for a share of Miller?

*Problems 11 through 13 refer to Softek Inc., a leader in the computer software field. Softek has two potentially big-selling products under development. Alpha, the first new product, seems very likely to catch on and is expected to drive the firm's growth rate to 25% for the next two years. However, software products have short lives, and growth can be expected to return to a more normal rate of 6% after that period if something new isn't launched immediately.*

*Beta, the second product, is a logical follow-on, but management isn't as confident about its success as it is about Alpha's. Softek's most recent yearly dividend was \$4, and firms in the industry typically return 14% on stockholder investments.*

11. You are an investment analyst for a brokerage firm and have been asked to develop a recommendation about Softek for the firm's clients. You've studied the fundamentals of the industry and the firm, and are now ready to determine what the stock should sell for based on the present value of future cash flows.
- Calculate a value for Softek's stock assuming product Alpha is successful but Beta isn't. In other words, assume two years of growth at 25% followed by 6% growth lasting indefinitely.
  - Calculate a price assuming Beta is also successful and holds Softek's growth rate at 25% for two additional years.
12. Calculate a price for Softek assuming Alpha is successful and Beta is also successful but doesn't do quite as well as Alpha. Assume Softek grows at 25% for two years and then at 18% for two more. After that it continues to grow at 6%. (*Hint: Don't be confused by the fact that there are now three growth periods. Just calculate successive dividends, multiplying by one plus the growth rate in effect until you get the first dividend into the period of normal growth. Then apply the Gordon model. A time line is a must for this problem.*)
13. How would you advise clients about Softek stock as an investment under the following conditions? Give reasons for your advice. (No calculations.)
- Softek is currently selling at a price very near that calculated in part (a) of Problem 11.
  - It is selling near the price calculated in Problem 12.
  - It is selling at a price slightly above that calculated in part (b) of Problem 11.
14. Garrett Corp. has been going through a difficult financial period. Over the past three years, its stock price has dropped from \$50 to \$18 per share. Throughout this downturn, Garrett has managed to pay a \$1 dividend each year. Management feels the worst is over but intends to maintain the \$1 dividend for three more years, after which they plan to increase it by 6% per year indefinitely. Comparable stocks are returning 11%.
- If these projections are accurate, is Garrett stock a good buy at \$18?
  - How do you think the market feels about Garrett's management?
15. It's early 2006 and General Motors Corporation has been going through some tough times lately. It's been losing a great deal of money, and its annual dividend

has been cut to \$1. The company's strategy is to restructure by getting smaller while working on labor and product line problems at the same time. Once that's done management feels the firm will return to profitability and begin a long period of growth at about 3% per year. Analysts generally feel the firm needs to shrink by a little less than 30%, but won't be able to downsize at a rate of more than 10% per year because of fixed costs and union contracts. GM's stock price has been declining steadily for some time and is now selling in the neighborhood of \$20 per share, which is the lowest it's been for many years.

You're an analyst for Barnstead and Heath, a small brokerage firm that employs a number of financial consultants who advise clients on stock investments. Some of the consultants feel that GM's management is on the right track and that their strategy will work as planned. Given that assumption, they've asked you if they should tell their clients that this is a good time to buy GM stock. How would you advise them?

16. Sudsy Inc. recently paid an annual dividend of \$1.00 per share. Analysts expect that amount to be paid for three years after which dividends will grow at a constant 5% per year indefinitely. The stock is currently trading at \$20, and investors require a 15% return on similar issues. Has the stock market properly priced Sudsy's stock?
17. Blackstone Corporation's \$7 preferred was issued five years ago. The risk-appropriate interest rate for the issue is currently 11%. What is this preferred selling for today?
18. Fox Woodworking Inc. issued preferred shares at a face value of \$50 to yield 9% 10 years ago. The shares are currently selling at \$60. What return are they earning for investors who buy them today?
19. The following preferred stocks are returning 8.5% to their owners who purchased the shares when they were issued:

Stock	Dividend	Current Price
A	5%	\$ 14.71
B	7	41.18
C	11	129.41

Calculate the prices at which they were issued.

20. Koski and Hass Inc. (K&H) just paid a \$2 dividend, which is expected to grow at 5% indefinitely. The return on comparable stocks is 9%. What percent of the intrinsic value of K&H stock is attributable to dividends paid more than 20 years in the future?
21. Seth Harris is an avid investor who likes to speculate on stock price changes. Lately, he's become bored with the slow movement of most stock prices and thinks options might be more exciting. He has been following the stock of Chelsea Club Inc., a women's apparel manufacturer. Chelsea's stock price has been stable for more than a year, but Seth is convinced it will increase in the near future but probably not rapidly.

Amanda Johnson owns 1,000 shares of Chelsea Club purchased a year ago at \$37. She thinks the stock's price will continue in the upper \$30s indefinitely and may even fall a little. Her broker has recommended writing options as a source of income on stagnant stocks.

Chelsea is selling for \$38, and six-month call options at a \$36 strike price sell for \$4.

This morning Amanda wrote call options on her 1,000 shares, which Seth bought through an options exchange. At the time of that transaction:

- a. What was the intrinsic value of an option?
- b. What was the option's time premium?
- c. Was the call in or out of the money?
- d. How much has Amanda invested?
- e. What is the most Seth can make or lose?
- f. What is the most Amanda can make or lose?

It's almost six months later, Chelsea is selling for \$44, Amanda's options are about to expire, and Seth exercises.

- g. What is Seth's profit or loss?
- h. What is Amanda's profit or loss?
- i. Does Amanda incur an "opportunity loss"? If so, how much is it?
- j. What would Amanda's profit or loss have been if her call had been written naked?

### INTERNET PROBLEM

22. The Sara Lee Corporation provides an excellent five-year summary of financial data at <http://www.saralee.com>. Use the constant growth model to estimate the value of Sara Lee. You can get the most recent dividend and the dividend growth rate (use the five-year rate) from the Web site. Use a 14% required rate of return. How does the value from the model compare to Sara Lee's current market price?

### COMPUTER PROBLEMS

23. The Rollins Metal Company is engaged in a long-term planning process and is trying to choose among several strategic options that imply different future growth rates for the company. Management feels that the main benefit of higher growth is that it enhances the firm's current stock price. However, high growth strategies have a cost in that they generally involve considerable risk. Higher risk means that investors demand higher returns, which tends to depress current stock price.

Management is having a hard time evaluating this cost–benefit trade-off because growth and risk are conceptual abstractions. In other words, it's hard to visualize how growth and risk interact with each other as well as with other things to produce stock prices. Management can, however, intuitively associate each strategy option with a growth rate and a required rate of return implied by risk.

You are a financial consultant who's been hired to help make some sense out of the situation. You feel your best approach is to develop a systematic relationship between return, growth, and stock price that you can show to management visually.

Use the STCKVAL program to develop the following chart assuming the strategic options result in different constant growth rates that start immediately. The firm's last dividend was \$2.35 per share.

### The Price of Rollins Stock as a Function of Growth Rate and the Return Required by Investors

		Growth Rates (g)			
		6%	8%	10%	12%
Required Returns (k)	7%		—	—	—
	9%			—	—
	11%				—
	13%				

Can you make any general comments about the risk-return trade-off based on your chart?

24. Suppose the strategic options available to the Rollins company in the last problem result in *temporarily* enhanced growth. Each option can be associated with a super normal growth rate that lasts for some period after which growth returns to the firm's normal 5%. Further suppose the duration of the super normal growth is a variable which can also be affected by strategic policy. Use the STCKVAL program for two-stage growth to develop the following chart assuming a required return of 10%.

### The Price of Rollins Stock as a Function of Temporary Growth Rate and Duration at a Required Return Rate of 10%

		Super Normal Growth Rates ( $g_1$ )			
		12%	14%	16%	18%
Duration of $g_1$ in Years (n)	2				
	4				
	6				
	8				

Can you use your chart to make any general comments about the risk-return trade-off under this assumption about the nature of the strategic options?

## DEVELOPING SOFTWARE

25. Program your own two-stage growth model for two years of super normal growth ( $g_1$ ) followed by normal growth ( $g_2$ ) lasting forever. Treat both growth rates, the last dividend ( $D_0$ ), and the required rate of return ( $k$ ) as inputs. Here's how to do it. (Refer to Figure 8.2 and Example 8.5 on pages 338–339. You'll be programming exactly that procedure.)
1. Lay out four cells horizontally in your spreadsheet (to represent a time line starting with time zero).
  2. Put  $D_0$  in the first cell.
  3. Form the next two cells by multiplying the one before by  $(1 + g_1)$ .
  4. Form the fourth cell by multiplying the third by  $(1 + g_2)$ .
  5. Calculate  $P_2$  in another cell using the Gordon model with the fourth cell in the numerator and  $(k - g_2)$  in the denominator.

6. Form  $P_0$  as the sum of the present values of the middle two cells in the time line and the present value of the cell carrying  $P_2$ .
26. Program a model for three years of super normal growth.

**THOMSON ONE** Business School Edition

Go to the text Web site at <http://lasher.swlearning.com>, select your book and click on the Thomson ONE button. Enter Thomson ONE—Business School Edition by using the username and password you created when you registered the serial number on your access card. Select a problem for this chapter, and you'll see an expanded version that includes instructions on how to navigate within the Thomson ONE system, as well as some additional explanation of the presentation format.

27. We can use Thomson ONE to value stocks with the Gordon Model. We'll illustrate with Sherwin Williams (SHW), a stable paint manufacturer.

Access Sherwin in Thomson ONE and calculate growth rates for dividends, earnings per share, and revenues. Select a rate you think reflects the company's potential. Use it and the most recent dividend to estimate intrinsic value assuming a modest 7% or 8% return. Find Sherwin's current stock price. Is it a good buy? Vary your assumptions about growth rate and return. What does it take to get an intrinsic value in line with the market's thinking?

Now try to do the same thing for the companies we worked on before. Summarize the problems you encounter. Do you think a two-stage Gordon model might work for Harley-Davidson?

28. We can also use a stock's price earnings ratio (P/E) to gauge whether it is over or under valued. Reread the Insights box on page 341, and make a chart listing the companies we've been working with down the left side along with column headings for the current P/E, six years of history, and the P/E ratios of a few peers. Access the Thomson ONE and record these ratios on your chart.

A firm's P/E ratio can be low in its historical range or relative to its peers because it has poor prospects, in which case the market correctly bids down price. However, the market often temporarily overreacts to bad news by driving a stock's price down. Then a low P/E can be a buying opportunity.

Combine your P/E information with any general information about these companies or the economy you have and make a judgment as to whether their stocks are undervalued, overvalued, or priced about right.