CHAPTER

6

Stock Valuation

OPENING CASE

When the stock market closed on January 26, 2010, the common stock of McGraw-Hill, publisher of fine-quality college textbooks, was selling for $34.23 per share. On that same day, Aéropostale, the well-known specialty retailer, closed at $33.74 per share, while electric utility company American Electric Power closed at $35.61. Since the stock prices of these three companies were so similar, you might expect that they would be offering similar dividends to their stockholders, but you would be wrong. In fact, American Electric's annual dividend was $1.64 per share, McGraw-Hill's was $0.94 per share, and Aéropostale was paying no dividends at all!

As we will see in this chapter, the dividends currently being paid are one of the primary factors we look at when attempting to value common stocks. However, it is obvious from looking at Aéropostale that current dividends are not the end of the story. This chapter explores dividends, stock values, and the connection between the two.

In our previous chapter, we introduced you to bonds and bond valuation. In this chapter, we turn to the other major source of financing for corporations, common and preferred stock. We first describe the cash flows associated with a share of stock and then go on to develop a very famous result, the dividend growth model. From there, we move on to examine various important features of common and preferred stock, focusing on shareholder rights. We close out the chapter with a discussion of how shares of stock are traded and how stock prices and other important information are reported in the financial press.

6.1 THE PRESENT VALUE OF COMMON STOCKS

Dividends versus Capital Gains

Our goal in this section is to value common stocks. We learned in the previous chapter that an asset's value is determined by the present value of its future cash flows. A stock provides two kinds of cash flows. First, many stocks pay dividends on a regular basis. Second, the stockholder receives the sale price when she sells the stock. Thus, in order to

value common stocks, we need to answer an interesting question: Is the value of a stock equal to:

1. The discounted present value of the sum of next period's dividend plus next period's stock price, or
2. The discounted present value of all future dividends?

This is the kind of question that students would love to see on a multiple-choice exam, because both (1) and (2) are right.

To see that (1) and (2) are the same, let's start with an individual who will buy the stock and hold it for one year. In other words, she has a one-year *holding period*. In addition, she is willing to pay P_0 for the stock today. That is, she calculates:

$$P_0 = \frac{\text{Div}_1}{1 + R} + \frac{P_1}{1 + R} \qquad [6.1]$$

Div_1 is the dividend paid at year's end and P_1 is the price at year's end. P_0 is the present value of the common stock investment. The term in the denominator, R, is the appropriate discount rate for the stock.

That seems easy enough, but where does P_1 come from? P_1 is not pulled out of thin air. Rather, there must be a buyer at the end of year 1 who is willing to purchase the stock for P_1. This buyer determines price by:

$$P_1 = \frac{\text{Div}_2}{1 + R} + \frac{P_2}{1 + R} \qquad [6.2]$$

Substituting the value of P_1 from Equation 6.2 into Equation 6.1 yields:

$$P_0 = \frac{1}{1 + R}\left[\text{Div}_1 + \left(\frac{\text{Div}_2 + P_2}{1 + R}\right)\right] \qquad [6.3]$$

$$= \frac{\text{Div}_1}{1 + R} + \frac{\text{Div}_2}{(1 + R)^2} + \frac{P_2}{(1 + R)^2}$$

We can ask a similar question for Formula 6.3: Where does P_2 come from? An investor at the end of year 2 is willing to pay P_2 because of the dividend and stock price at year 3. This process can be repeated *ad nauseam*.[1] At the end, we are left with

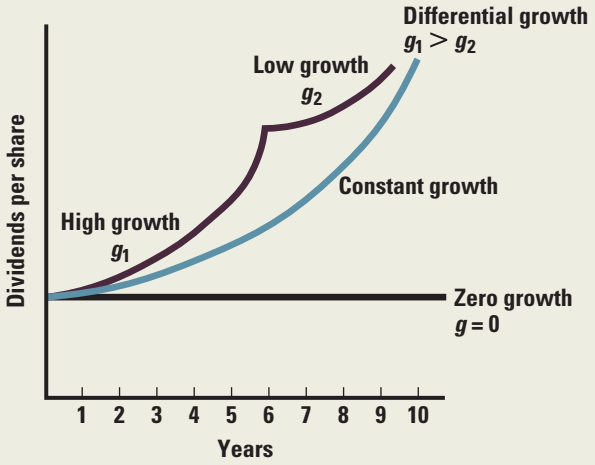
$$P_0 + \frac{\text{Div}_1}{1 + R} + \frac{\text{Div}_2}{(1 + R)^2} + \frac{\text{Div}_3}{(1 + R)^3} + \cdots = \sum_{t=1}^{\infty} \frac{\text{Div}_t}{(1 + R)^t} \qquad [6.4]$$

Thus the value of a firm's common stock to the investor is equal to the present value of all of the expected future dividends.

This is a very useful result. A common objection to applying present value analysis to stocks is that investors are too shortsighted to care about the long-run stream of dividends. These critics argue that an investor will generally not look past his or her time horizon. Thus, prices in a market dominated by short-term investors will reflect only near-term dividends. However, our discussion shows that a long-run dividend discount model holds even when investors have short-term time horizons. Although an investor may want to cash out early, she must find another investor who is willing to buy. The price this second investor pays is dependent on dividends *after* his date of purchase.

[1]This procedure reminds us of the physicist lecturing on the origins of the universe. He was approached by an elderly gentleman in the audience who disagreed with the lecture. The attendee said that the universe rests on the back of a huge turtle. When the physicist asked what the turtle rested on, the gentleman said another turtle. Anticipating the physicist's objections, the attendee said, "Don't tire yourself out, young fellow. It's turtles all the way down."

FIGURE 6.1
Zero Growth, Constant Growth, and Differential Growth Patterns



Dividend growth models

$$\text{Zero growth: } P_0 = \frac{\text{Div}}{R}$$

$$\text{Constant growth: } P_0 = \frac{\text{Div}}{R - g}$$

$$\text{Differential growth: } P_0 = \sum_{t=1}^{T} \frac{\text{Div}(1+g_1)^t}{(1+R)^t} + \frac{\dfrac{\text{Div}_{T+1}}{R-g_2}}{(1+R)^T}$$

Valuation of Different Types of Stocks

The above discussion shows that the value of the firm is the present value of its future dividends. How do we apply this idea in practice? Equation 6.4 represents a very general model and is applicable regardless of whether the level of expected dividends is growing, fluctuating, or constant. The general model can be simplified if the firm's dividends are expected to follow some basic patterns: (1) zero growth, (2) constant growth, and (3) differential growth. These cases are illustrated in Figure 6.1.

CASE 1 (ZERO GROWTH) The value of a stock with a constant dividend is given by

$$P_0 = \frac{\text{Div}_1}{1+R} + \frac{\text{Div}_2}{(1+R)^2} + \cdots = \frac{\text{Div}}{R}$$

Here it is assumed that $\text{Div}_1 = \text{Div}_2 = \cdots = \text{Div}$. This is just an application of the perpetuity formula from a previous chapter.

CASE 2 (CONSTANT GROWTH) Dividends grow at rate g, as follows:

End of Year	1	2	3	4	. . .
Dividend	Div	Div$(1+g)$	Div$(1+g)^2$	Div$(1+g)^3$	

Note that Div is the dividend at the end of the *first* period.

EXAMPLE 6.1

Projected Dividends

Hampshire Products will pay a dividend of $4 per share a year from now. Financial analysts believe that dividends will rise at 6 percent per year for the foreseeable future. What is the dividend per share at the end of each of the first five years?

End of Year	1	2	3	4	5
Dividend	$4.00	$4 × (1.06) = $4.24	$4 × (1.06)^2 = $4.4944	$4 × (1.06)^3 = $4.7641	$4 × (1.06)^4 = $5.0499

The value of a common stock with dividends growing at a constant rate is

$$P_0 = \frac{\text{Div}}{1+R} + \frac{\text{Div}(1+g)}{(1+R)^2} + \frac{\text{Div}(1+g)^2}{(1+R)^3} + \frac{\text{Div}(1+g)^3}{(1+R)^4} + \cdots = \frac{\text{Div}}{R-g}$$

where g is the growth rate. Div is the dividend on the stock at the end of the first period. This is the formula for the present value of a growing perpetuity, which we derived in a previous chapter.

EXAMPLE 6.2

Stock Valuation

Suppose an investor is considering the purchase of a share of the Utah Mining Company. The stock will pay a $3 dividend a year from today. This dividend is expected to grow at 10 percent per year ($g = 10\%$) for the foreseeable future. The investor thinks that the required return (R) on this stock is 15 percent, given her assessment of Utah Mining's risk. (We also refer to R as the discount rate of the stock.) What is the value of a share of Utah Mining Company's stock?

Using the constant growth formula of case 2, we assess the value to be $60:

$$\$60 = \frac{\$3}{.15 - .10}$$

P_0 is quite dependent on the value of g. If g had been estimated to be 12.5 percent, the value of the share would have been:

$$\$120 = \frac{\$3}{.15 - .125}$$

The stock price doubles (from $60 to $120) when g only increases 25 percent (from 10 percent to 12.5 percent). Because of P_0's dependency on g, one must maintain a healthy sense of skepticism when using this constant growth of dividends model.

Furthermore, note that P_0 is equal to infinity when the growth rate, g, equals the discount rate, R. Because stock prices do not grow infinitely, an estimate of g greater than R implies an error in estimation. More will be said of this point later.

The assumption of steady dividend growth might strike you as peculiar. Why would the dividend grow at a constant rate? The reason is that, for many companies, steady growth in dividends is an explicit goal. For example, in 2009, Procter & Gamble, the Cincinnati-based maker of personal care and household products, increased its annual dividend by 11 percent to $1.72 per share; this increase was notable because it was the 53rd in a row. The subject of dividend growth falls under the general heading of dividend policy, so we will defer further discussion of it to a later chapter.

CASE 3 (DIFFERENTIAL GROWTH) In this case, an algebraic formula would be too unwieldy. Instead, we present examples.

EXAMPLE 6.3

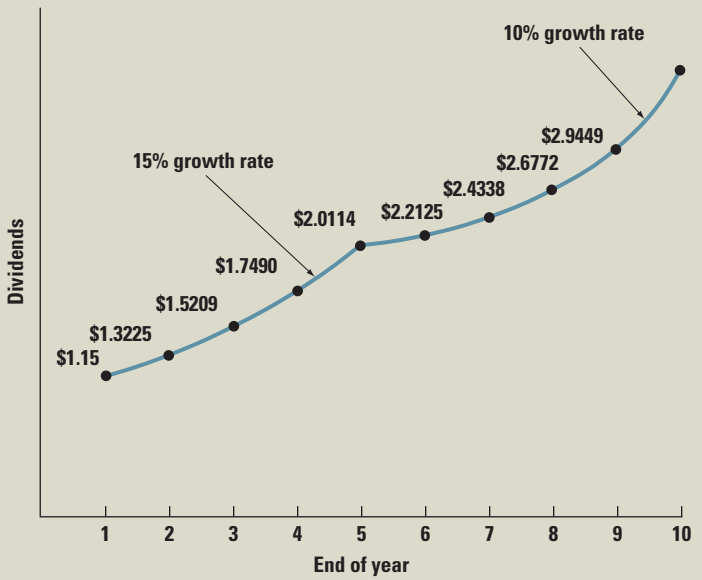
Differential Growth

Consider the stock of Elixir Drug Company, which has a new back-rub ointment and is enjoying rapid growth. The dividend for a share of stock a year from today will be $1.15. During the next four years, the dividend will grow at 15 percent per year ($g_1 = 15\%$). After that, growth (g_2) will be equal to 10 percent per year. Can you calculate the present value of the stock if the required return (R) is 15 percent?

Figure 6.2 displays the growth in the dividends. We need to apply a two-step process to discount these dividends. We first calculate the present value of the dividends growing at 15 percent per annum. That is, we first calculate the present value of the dividends at the end of each of the first five years. Second, we calculate the present value of the dividends beginning at the end of year 6.

FIGURE 6.2

Growth in Dividends for Elixir Drug Company



Calculate Present Value of First Five Dividends The present value of dividend payments in years 1 through 5 is as follows:

FUTURE YEAR	GROWTH RATE (g_1)	EXPECTED DIVIDEND	PRESENT VALUE
1	.15	$1.15	$1
2	.15	1.3225	1
3	.15	1.5209	1
4	.15	1.7490	1
5	.15	2.0114	1
Years 1–5	The present value of dividends = $5		

The growing annuity formula of the previous chapter could normally be used in this step. However, note that dividends grow at 15 percent, which is also the discount rate. Since $g = R$, the growing annuity formula cannot be used in this example.

(*continued*)

Calculate Present Value of Dividends Beginning at End of Year 6 This is the procedure for deferred perpetuities and deferred annuities that we mentioned in a previous chapter. The dividends beginning at the end of year 6 are

End of Year	6	7	8	9
Dividend	$\text{Div}_5 \times (1 + g_2)$ $\$2.0114 \times 1.10$ $= \$2.2125$	$\text{Div}_5 \times (1 + g_2)^2$ $2.0114 \times (1.10)^2$ $= \$2.4338$	$\text{Div}_5 \times (1 + g_2)^3$ $2.0114 \times (1.10)^3$ $= \$2.6772$	$\text{Div}_5 \times (1 + g_2)^4$ $2.0114 \times (1.10)^4$ $= \$2.9449$

As stated in the previous chapter, the growing perpetuity formula calculates present value as of one year prior to the first payment. Because the payment begins at the end of year 6, the present value formula calculates present value as of the end of year 5.

The price at the end of year 5 is given by

$$P_5 = \frac{\text{Div}_6}{R - g_2} = \frac{\$2.2125}{.15 - .10} = \$44.25$$

The present value of P_5 at the end of year 0 is

$$\frac{P_5}{(1+R)^5} = \frac{\$44.25}{(1.15)^5} = \$22$$

The present value of *all* dividends as of the end of year 0 is \$27 (= \$22 + \$5).

6.2 ESTIMATES OF PARAMETERS IN THE DIVIDEND DISCOUNT MODEL

The value of the firm is a function of its growth rate, g, and its discount rate, R. How does one estimate these variables?

Where Does *g* Come From?

The previous discussion on stocks assumed that dividends grow at the rate g. We now want to estimate this rate of growth. This section extends the discussion of growth contained in Chapter 3. Consider a business whose earnings next year are expected to be the same as earnings this year unless a *net investment* is made. This situation is likely to occur, because net investment is equal to gross, or total, investment less depreciation. A net investment of zero occurs when *total investment* equals depreciation. If total investment is equal to depreciation, the firm's physical plant is maintained, consistent with no growth in earnings.

Net investment will be positive only if some earnings are not paid out as dividends, that is, only if some earnings are retained.[2] This leads to the following equation:

$$\begin{array}{c} \textbf{Earnings next year} \\ \textbf{Increase in earnings} \end{array} = \textbf{Earnings this year} + \textbf{Retained earnings this year} \times \textbf{Return on retained earnings} \qquad [6.5]$$

The increase in earnings is a function of both the *retained earnings* and the *return on the retained earnings*.

We now divide both sides of Equation 6.5 by earnings this year, yielding

$$\frac{\textbf{Earnings next year}}{\textbf{Earnings this year}} = \frac{\textbf{Earnings this year}}{\textbf{Earnings this year}} + \left(\frac{\textbf{Retained earnings this year}}{\textbf{Earnings this year}}\right) \times \textbf{Return on retained earnings} \qquad [6.6]$$

[2]We ignore the possibility of the issuance of stocks or bonds in order to raise capital. These possibilities are considered in later chapters.

The left-hand side of Equation 6.6 is simply one plus the growth rate in earnings, which we write as $1 + g$. The ratio of retained earnings to earnings is called the **retention ratio**. Thus, we can write

$$\mathbf{1 + g = 1 + \text{Retention ratio} \times \text{Return on retained earnings}} \quad \textbf{[6.7]}$$

It is difficult for a financial analyst to determine the return to be expected on currently retained earnings, because the details on forthcoming projects are not generally public information. However, it is frequently assumed that the projects selected in the current year have an anticipated return equal to returns from projects in other years. Here, we can estimate the anticipated return on current retained earnings by the historical **return on equity** or ROE. After all, ROE is simply the return on the firm's entire equity, which is the return on the cumulation of all the firm's past projects.

From Equation 6.7, we have a simple way to estimate growth:

Formula for Firm's Growth Rate:

$$\mathbf{g = \text{Retention ratio} \times \text{Return on retained earnings (ROE)}} \quad \textbf{[6.8]}$$

Previously g referred to growth in dividends. However, the growth in earnings is equal to the growth rate in dividends in this context, because as we will presently see, the ratio of dividends to earnings is held constant. In fact, as you have probably figured out, g is the sustainable growth rate we introduced in Chapter 3.

EXAMPLE 6.4

Earnings Growth

Pagemaster Enterprises just reported earnings of $2 million. It plans to retain 40 percent of its earnings. The historical return on equity (ROE) has been .16, a figure that is expected to continue into the future. How much will earnings grow over the coming year?

We first perform the calculation without reference to Equation 6.8. Then we use (6.8) as a check.

Calculation without Reference to Equation 6.8 The firm will retain $800,000 (= 40% × $2 million). Assuming that historical ROE is an appropriate estimate for future returns, the anticipated increase in earnings is

$$\$800{,}000 \times .16 = \$128{,}000$$

The percentage growth in earnings is

$$\frac{\text{Change in earnings}}{\text{Total earnings}} = \frac{\$128{,}000}{\$2 \text{ million}} = .064$$

This implies that earnings in one year will be $2,128,000 (= $2,000,000 × 1.064).

Check Using Equation 6.8 We use g = Retention ratio × ROE. We have

$$g = .4 \times .16 = .064$$

Where Does *R* Come From?

Thus far, we have taken the required return, or discount rate R, as given. We will have quite a bit to say on this subject in later chapters. For now, we want to examine the implications of the dividend growth model for this required return. Earlier, we calculated P_0 as:

$$\mathbf{P_0 = \text{Div}/(R - g)}$$

Now let's assume we know P_0. If we rearrange this equation to solve for R, we get:

$$\begin{aligned} \mathbf{R - g} &= \mathbf{\text{Div}/P_0} \\ \mathbf{R} &= \mathbf{\text{Div}/P_0 + g} \end{aligned} \quad \textbf{[6.9]}$$

This tells us that the total return, R, has two components. The first of these, Div/P_0, is called the **expected dividend yield**. Because this is calculated as the expected cash dividend divided by the current price, it is conceptually similar to the current yield on a bond.

The second part of the total return is the growth rate, g. As we will verify shortly, the dividend growth rate is also the rate at which the stock price grows. Thus, this growth rate can be interpreted as the **capital gains yield**, that is, the rate at which the value of the investment grows.

To illustrate the components of the required return, suppose we observe a stock selling for $20 per share. The next dividend will be $1 per share. You think that the dividend will grow by 10 percent per year more or less indefinitely. What return does this stock offer you if this is correct?

The dividend growth model calculates total return as:

$$\begin{aligned} R &= \text{Dividend yield} + \text{Capital gains yield} \\ R &= \quad \text{Div}/P_0 \quad + \quad\quad g \end{aligned}$$

In this case, total return works out to be:

$$\begin{aligned} R &= \$1/20 + 10\% \\ &= 5\% + 10\% \\ &= 15\% \end{aligned}$$

This stock, therefore, has an expected return of 15 percent.

We can verify this answer by calculating the price in one year, P_1, using 15 percent as the required return. Based on the dividend growth model, this price is:

$$\begin{aligned} P_1 &= \text{Div} \times (1 + g)/(R - g) \\ &= \$1 \times 1.10/(.15 - .10) \\ &= \$1.10/.05 \\ &= \$22 \end{aligned}$$

Notice that this $22 is 20×1.1, so the stock price has grown by 10 percent as it should. If you pay $20 for the stock today, you will get a $1 dividend at the end of the year, and you will have a $22 − 20 = $2 gain. Your dividend yield is thus $1/20 = 5 percent. Your capital gains yield is $2/20 = 10 percent, so your total return would be 5 percent + 10 percent = 15 percent.

To get a feel for actual numbers in this context, consider that, according to the 2009 Value Line *Investment Survey*, Procter & Gamble's dividends were expected to grow by 6.0 percent over the next 5 or so years, compared to a historical growth rate of 11.5 percent over the preceding 5 years and 11 percent over the preceding 10 years. In 2009, the projected dividend for the coming year was given as $1.72. The stock price at that time was about $57 per share. What is the return investors require on P&G? Here, the dividend yield is 3.0 percent and the capital gains yield is 6.0 percent, giving a total required return of 9.0 percent on P&G stock.

EXAMPLE 6.5

Calculating the Required Return

Pagemaster Enterprises, the company examined in the previous example, has 1,000,000 shares of stock outstanding. The stock is selling at $10. What is the required return on the stock?

Because the retention ratio is 40 percent, the **payout ratio** is 60 percent (1 − Retention ratio). The payout ratio is the ratio of dividends/earnings. Because earnings a year from now will be $2,128,000 (= $2,000,000 × 1.064), dividends will be $1,276,800 (= .60 × $2,128,000). Dividends per share will be $1.28 (= $1,276,800/1,000,000). Given our previous result that $g = .064$, we calculate R from (6.9) as follows:

$$.192 = \frac{\$1.28}{10.00} + .064$$

THE REAL WORLD

HOW FAST IS TOO FAST?

Growth rates are an important tool for evaluating a company and, as we have seen, an important part of valuing a company's stock. When you're thinking about (and calculating) growth rates, a little common sense goes a long way. For example, in 2009, retailing giant Walmart had about 1.3 billion square feet of stores, distribution centers, and so forth. The company expected to increase its square footage by about 4 percent over the next year. This doesn't sound too outrageous, but can Walmart grow its square footage at 4 percent indefinitely?

Using the compound growth calculation we discussed in an earlier chapter, see if you agree that if Walmart grows at 4 percent per year over the next 287 years, the company will have about 100 trillion square feet under roof, which is about the total land mass of the entire United States! In other words, if Walmart keeps growing at 4 percent, the entire country will eventually be one big Walmart. Scary.

XM Satellite Radio is another example. The company had total revenues of about $500,000 in 2001 and revenues of about $2.472 billion in 2009. This represents an annual increase of 189.6 percent! How likely is it that the company can continue to grow at this rate? If this growth continued, the company would have revenues of about $35.4 trillion in just nine years, which is more than twice the gross domestic product (GDP) of the United States. Obviously, XM Radio's growth rate will slow substantially in the next several years.

What about growth in cash flow? As of the end of 2009, online auction site eBay had grown its cash flow at an annual rate of about 74 percent for the previous 10 years. The company generated about $2.3 billion in cash flow for 2009. If the company grew its cash flow at that same rate for the next 17 years, it would generate over $1.24 trillion per year, which is more than the total amount of U.S. currency in the world.

As these examples show, growth rates shouldn't just be extrapolated into the future. It is fairly easy for a small company to grow very fast. If a company has $100 in sales, it only has to increase sales by another $100 to have a 100 percent increase in sales. If the company's sales are $10 billion, it has to increase sales by another $10 billion to achieve the same 100 percent increase. So, long-term growth rate estimates must be chosen very carefully. As a rule of thumb, for really long-term growth rate estimates, you should probably assume that a company will not grow much faster than the economy as a whole, which is probably noticeably less than 5 percent (inflation adjusted).

A Healthy Sense of Skepticism

It is important to emphasize that our approach merely *estimates g*; our approach does not *determine g* precisely. We mentioned earlier that our estimate of g is based on a number of assumptions. For example, we assume that the return on reinvestment of future retained earnings is equal to the firm's past ROE. We assume that the future retention ratio is equal to the past retention ratio. Our estimate for g will be off if these assumptions prove to be wrong.

Unfortunately, the determination of R is highly dependent on g. In the Pagemaster Enterprises example, if g is estimated to be 0, R equals 12.8 percent (= \$1.28/\$10.00). If g is estimated to be 12 percent, R equals 24.8 percent (= \$1.28/\$10.00 + 12%). Thus, one should view estimates of R with a healthy sense of skepticism.

Because of the preceding, some financial economists generally argue that the estimation error for R for a single security is too large to be practical. Therefore, they suggest calculating the average R for an entire industry. This R would then be used to discount the dividends of a particular stock in the same industry.

One should be particularly skeptical of two polar cases when estimating R for individual securities. First, consider a firm currently paying no dividend. The stock price will be above zero because investors believe that the firm may initiate a dividend at some point or the firm may be acquired at some point. However, when a firm goes from no dividends to a positive number of dividends, the implied growth rate is *infinite*. Thus, Equation 6.9 must be used with extreme caution here, if at all—a point we emphasize later in this chapter.

Second, we mentioned earlier that the value of the firm is infinite when g is equal to R. Because prices for stocks do not grow infinitely, an analyst whose estimate of g for a particular firm is equal to or above R must have made a mistake. Most likely, the analyst's high estimate for g is correct for the next few years. However, firms simply cannot maintain an abnormally high growth rate *forever*. The analyst's error was to use a short-run estimate of g in a model requiring a perpetual growth rate. A nearby *The Real World* box discusses the consequences of long-term growth at unrealistic rates.

Total Payout

So far we have assumed that dividends are the only cash payouts of the firm to its shareholders. Actually, in recent times, firms frequently pay cash to shareholders by buying back shares of stock outstanding. Share repurchase payouts can be thought of as substitutes for cash dividend payouts. Much more will be said about the pros and cons of dividends versus share repurchase payouts. One consequence of a share repurchase is that a firm's number of shares outstanding decreases. If we incorporate total payouts into our model we must also focus on the total number of shares currently outstanding.

To see how share repurchase payouts might work in the constant growth version of the dividend discount model, suppose Trojan Foods has 100 million shares outstanding and expects net income at the end of the year of $400 million. Trojan plans to pay out 60 percent of its net income, paying 30 percent in dividends and 30 percent to repurchase shares. Trojan expects net income to increase by 5 percent per year in perpetuity. If Trojan's required return is 10 percent, what is its share price? First, we must calculate total value and then divide by the number of current shares outstanding.

Notice the difference in the total payout model if we focus on total payout to solve for price per share and not dividends per share.

$$\text{Total PV} = \frac{\$240 \text{ million}}{.10 - .05} = \$4.8 \text{ billion}$$

$$\text{Price per share} = \frac{\$4.8 \text{ billion}}{100 \text{ million shares}} = \$48 \text{ per share}$$

6.3 GROWTH OPPORTUNITIES

We previously spoke of the growth rate of dividends. We now want to address the related concept of growth opportunities. Imagine a company with a level stream of earnings per share in perpetuity. The company pays all of these earnings out to stockholders as dividends. Hence,

$$\text{EPS} = \text{Div}$$

where EPS is *earnings per share* and Div is dividends per share. A company of this type is frequently called a *cash cow*.

From the perpetuity formula of the previous chapter, the value of a share of stock is:

Value of a Share of Stock When Firm Acts as a Cash Cow:

$$\frac{\text{EPS}}{R} = \frac{\text{Div}}{R}$$

where R is the discount rate on the firm's stock.

This policy of paying out all earnings as dividends may not be the optimal one. Many firms have *growth* opportunities, that is, opportunities to invest in profitable projects. Because these projects can represent a significant fraction of the firm's value, it would be foolish to forgo them in order to pay out all earnings as dividends.

Although firms frequently think in terms of a *set* of growth opportunities, let's focus on only one opportunity, that is, the opportunity to invest in a single project. Suppose the

firm retains the entire dividend at date 1 in order to invest in a particular capital budgeting project. The net present value *per share* of the project as of date 0 is *NPVGO*, which stands for the *net present value* (*per share*) *of the growth opportunity*.

What is the price of a share of stock at date 0 if the firm decides to take on the project at date 1? Because the per share value of the project is added to the original stock price, the stock price must now be:

Stock Price after Firm Commits to New Project:

$$\frac{\text{EPS}}{R} + \text{NPVGO} \qquad \textbf{[6.10]}$$

Thus, Equation 6.10 indicates that the price of a share of stock can be viewed as the sum of two different items. The first term (EPS/*R*) is the value of the firm if it rested on its laurels, that is, if it simply distributed all earnings to the stockholders. The second term is the *additional* value if the firm retains earnings in order to fund new projects.

EXAMPLE 6.6

Growth Opportunities

Sarro Shipping, Inc., expects to earn $1 million per year in perpetuity if it undertakes no new investment opportunities. There are 100,000 shares of stock outstanding, so earnings per share equal $10 (= $1,000,000/100,000). The firm will have an opportunity at date 1 to spend $1,000,000 on a new marketing campaign. The new campaign will increase earnings in every subsequent period by $210,000 (or $2.10 per share). This is a 21 percent return per year on the project. The firm's discount rate is 10 percent. What is the value per share before and after deciding to accept the marketing campaign?

The value of a share of Sarro Shipping before the campaign is:

Value of a Share of Sarro When Firm Acts as a Cash Cow:

$$\frac{\text{EPS}}{R} = \frac{\$10}{.1} = \$100$$

The value of the marketing campaign as of date 1 is:

Value of Marketing Campaign at Date 1:

$$-\$1{,}000{,}000 + \frac{\$210{,}000}{.1} = \$1{,}100{,}000 \qquad \textbf{[6.11]}$$

Because the investment is made at date 1 and the first cash inflow occurs at date 2, Equation (6.11) represents the value of the marketing campaign as of date 1. We determine the value at date 0 by discounting back one period as follows:

Value of Marketing Campaign at Date 0:

$$\frac{\$1{,}100{,}000}{1.1} = \$1{,}000{,}000$$

Thus, NPVGO per share is $10 (= $1,000,000/100,000).

The price per share is:

$$\text{EPS}/R + \text{NPVGO} = \$100 + \$10 = \$110$$

The calculation can also be made on a straight net present value basis. Because all the earnings at date 1 are spent on the marketing effort, no dividends are paid to stockholders at that date. Dividends in all subsequent periods are $1,210,000 (= $1,000,000 + 210,000). In this case, $1,000,000 is the annual dividend when Sarro is a cash cow. The additional contribution to the dividend from the marketing effort is $210,000. Dividends per share are $12.10 (= $1,210,000/100,000). Because these dividends start at date 2, the price per share at date 1 is $121 (= $12.10/.1). The price per share at date 0 is $110 (= $121/1.1).

Note that value is created in Example 6.6 because the project earned a 21 percent rate of return when the discount rate was only 10 percent. No value would have been created had

the project earned a 10 percent rate of return. The NPVGO would have been zero, and value would have been negative had the project earned a percentage return below 10 percent. The NPVGO would be negative in that case.

Two conditions must be met in order to increase value.

1. Earnings must be retained so that projects can be funded.[3]
2. The projects must have positive net present value.

Growth in Earnings and Dividends versus Growth Opportunities

As mentioned earlier, a firm's value increases when it invests in growth opportunities with positive NPVGOs. A firm's value falls when it selects opportunities with negative NPVGOs. However, dividends can grow whether projects with positive NPVs or negative NPVs are selected. This surprising result can be explained by the following example.

EXAMPLE 6.7

NPV versus Dividends

Lane Supermarkets, a new firm, will earn $100,000 a year in perpetuity if it pays out all its earnings as dividends. However, the firm plans to invest 20 percent of its earnings in projects that earn 10 percent per year. The discount rate is 18 percent. An earlier formula tells us that the growth rate of dividends is

$$g = \text{Retention ratio} \times \text{Return on retained earnings} = .2 \times .10 = 2\%$$

For example, in this first year of the new policy, dividends are $80,000 [$=(1 - .2) \times \$100{,}000$]. Dividends next year are $81,600 ($= \$80{,}000 \times 1.02$). Dividends the following year are $83,232 [$= \$80{,}000 \times (1.02)^2$] and so on. Because dividends represent a fixed percentage of earnings, earnings must grow at 2 percent a year as well.

However, note that the policy reduces value because the rate of return on the projects of 10 percent is less than the discount rate of 18 percent. That is, the firm would have had a higher value at date 0 if it had a policy of paying all its earnings out as dividends. Thus, a policy of investing in projects with negative NPVs rather than paying out earnings as dividends will lead to growth in dividends and earnings, but will reduce value.

The No-Payout Firm

Students frequently ask the following question: If the dividend discount model is correct, why aren't no-payout stocks selling at zero? This is a good question and gets at the goals of the firm. A firm with many growth opportunities is faced with a dilemma. The firm can pay out cash now, or it can forgo cash payments now so that it can make investments that will generate even greater payouts in the future.[4] This is often a painful choice, because a strategy of deferment may be optimal yet unpopular among certain stockholders.

Many firms choose to pay no cash to stockholders—and these firms sell at positive prices. For example, many Internet firms, such as Google, pay no cash to stockholders. Rational shareholders believe that they will either receive a payout at some point or they will receive something just as good. That is, the firm will be acquired in a merger, with the stockholders receiving either cash or shares of stock at that time.

Of course, the actual application of the dividend discount model is difficult for firms of this type. Clearly, the model for constant growth of payouts does not exactly apply. Though

[3]Later in the text, we speak of issuing stock or debt in order to fund projects.

[4]A third alternative is to issue stock so that the firm has enough cash both to pay dividends and to invest. This possibility is explored in a later chapter.

the differential growth model can work in theory, the difficulties of estimating the date of the first payout, the growth rate of payouts after that date, and the ultimate merger price make application of the model quite difficult in reality.

Empirical evidence suggests that firms with high growth rates are likely to have lower payouts, a result consistent with the above analysis. For example, consider Microsoft Corporation. The company started in 1975 and grew rapidly for many years. It paid its first dividend in 2003, though it was a billion-dollar company (in both sales and market value of stockholders' equity) prior to that date. Why did it wait so long to pay a dividend? It waited because it had so many positive growth opportunities, that is, new software products, to take advantage of.

6.4 PRICE-EARNINGS RATIO

We argued earlier that one should not discount earnings in order to determine price per share. Nevertheless, financial analysts frequently relate earnings and price per share, as made evident by their heavy reliance on the price-earnings (or PE) ratio.

Our previous discussion stated that

$$\text{Price per share} = \frac{\text{EPS}}{R} + \text{NPVGO}$$

Dividing by EPS yields

$$\frac{\text{Price per share}}{\text{EPS}} = \frac{1}{R} + \frac{\text{NPVGO}}{\text{EPS}}$$

The left-hand side is the formula for the price-earnings ratio.[5] The equation shows that the PE ratio is related to the net present value of growth opportunities. As an example, consider two firms, each having just reported earnings per share of $1. However, one firm has many valuable growth opportunities, while the other firm has no growth opportunities at all. The firm with growth opportunities should sell at a higher price, because an investor is buying both current income of $1 and growth opportunities. Suppose that the firm with growth opportunities sells for $16 and the other firm sells for $8. The $1 earnings per share number appears in the denominator of the PE ratio for both firms. Thus, the PE ratio is 16 for the firm with growth opportunities, but only 8 for the firm without the opportunities.

This explanation seems to hold fairly well in the real world. Electronic and other high-tech stocks generally sell at very high PE ratios (or *multiples*, as they are often called) because they are perceived to have high growth rates. In fact, some technology stocks sell at high prices even though the companies have never earned a profit. The PE ratios of these companies are infinite. Conversely, railroads, utilities, and steel companies sell at lower

[5]We can also use the constant growth version of the dividend discount model to solve for the price-earnings ratio.

Recall that

$$\text{Price per share} = \frac{\text{Div}}{R - g}$$

If Div can be expressed as $\text{EPS}_1 \times (1 - b)$, where EPS_1 is earnings per share in time 1 $-$ *b*, *b* is the plowback ratio (where 1 $-$ *b* is the dividend payout ratio), and $\text{EPS}_0 (1 + g) = \text{EPS}_1$, then

$$\text{Price per share} = \frac{\text{EPS}_0(1 + g)(1 - b)}{R - g}$$

dividing by EPS_0 yields

$$\frac{\text{Price per share}}{\text{EPS}_0} = \frac{(1 + g)(1 - b)}{R - g}.$$

COMPANY	INDUSTRY	PE RATIO
Pfizer	Pharmaceuticals	14.9
ExxonMobil	Integrated energy	17.4
Nordstrom	Clothing retail	23.6
Google	Online advertising	37.2
Ryder	Truck rentals	37.4
Starbucks	Expensive coffee	41.9
COUNTRY		
Brazil		12.3
U.S. S&P 500 average	n/a	18.4
China		19.2
India		21.8

TABLE 6.1
Selected PE Ratios, 2009
Source for Countries: *Financial Times,* Nov. 16, 2009.

multiples because of the prospects of lower growth. Table 6.1 contains PE ratios in 2009 for some well-known U.S. companies and the U.S. S&P 500 Index and in Brazil, India, and China. Notice the variations across industries and countries.

Of course, the market is merely pricing *perceptions* of the future, not the future itself. We will argue later in the text that the stock market generally has realistic perceptions of a firm's prospects. However, this is not always true. In the late 1990s, many Internet firms were selling at multiples of over 200 times earnings. For many, the high perceived growth rates did not materialize, causing great declines in stock prices during the early 2000s. In earlier decades, fortunes were made in stocks like IBM and Xerox because the high growth rates were not anticipated by investors.

There are two additional factors explaining the PE ratio. The first is the discount rate, R. The above formula shows that the PE ratio is *negatively* related to the firm's discount rate. We have already suggested that the discount rate is positively related to the stock's risk or variability. Thus, the PE ratio is negatively related to the stock's risk. To see that this is a sensible result, consider two firms, A and B, behaving as cash cows. The stock market *expects* both firms to have annual earnings of $1 per share forever. However, the earnings of firm A are known with certainty while the earnings of firm B are quite variable. A rational stockholder is likely to pay more for a share of firm A because of the absence of risk. If a share of firm A sells at a higher price and both firms have the same EPS, the PE ratio of firm A must be higher.

The second additional factor concerns the firm's choice of accounting methods. Under current accounting rules, companies are given a fair amount of leeway. For example, consider inventory accounting where either FIFO or LIFO may be used. In an inflationary environment, *FIFO* (*first in–first out*) accounting understates the true cost of inventory and hence inflates reported earnings. Inventory is valued according to more recent costs under *LIFO* (*last in–first out*), implying that reported earnings are lower here than they would be under FIFO. Thus, LIFO inventory accounting is a more *conservative* method than FIFO. Similar accounting leeway exists for construction costs (*completed contracts* versus *percentage-of-completion methods*) and depreciation (*accelerated depreciation* versus *straight-line depreciation*).

As an example, consider two identical firms, C and D. Firm C uses LIFO and reports earnings of $2 per share. Firm D uses the less conservative accounting assumptions of FIFO and reports earnings of $3 per share. The market knows that both firms are identical and prices both at $18 per share. This price-earnings ratio is 9 (= $18/$2) for firm C and 6 (= $18/$3) for firm D. Thus, the firm with the more conservative principles has the higher PE ratio.

6.5 SOME FEATURES OF COMMON AND PREFERRED STOCKS

In discussing common stock features, we focus on shareholder rights and dividend payments. For preferred stock, we explain what the "preferred" means, and we also debate whether preferred stock is really debt or equity.

Common Stock Features

The term **common stock** means different things to different people, but it is usually applied to stock that has no special preference either in receiving dividends or in bankruptcy.

SHAREHOLDER RIGHTS The conceptual structure of the corporation assumes that shareholders elect directors who, in turn, hire management to carry out their directives. Shareholders, therefore, control the corporation through the right to elect the directors. Generally, only shareholders have this right.

Directors are elected each year at an annual meeting. Although there are exceptions (discussed next), the general idea is "one share, one vote" (*not* one *shareholder,* one vote). Corporate democracy is thus very different from our political democracy. With corporate democracy, the "golden rule" prevails absolutely.[6]

Directors are elected at an annual shareholders' meeting by a vote of the holders of a majority of shares who are present and entitled to vote. However, the exact mechanism for electing directors differs across companies. The most important difference is whether shares must be voted cumulatively or voted straight.

To illustrate the two different voting procedures, imagine that a corporation has two shareholders: Smith with 20 shares and Jones with 80 shares. Both want to be a director. Jones does not want Smith, however. We assume there are a total of four directors to be elected.

The effect of **cumulative voting** is to permit minority participation.[7] If cumulative voting is permitted, the total number of votes that each shareholder may cast is determined first. This is usually calculated as the number of shares (owned or controlled) multiplied by the number of directors to be elected.

With cumulative voting, the directors are elected all at once. In our example, this means that the top four vote getters will be the new directors. A shareholder can distribute votes however he/she wishes.

Will Smith get a seat on the board? If we ignore the possibility of a five-way tie, then the answer is yes. Smith will cast $20 \times 4 = 80$ votes, and Jones will cast $80 \times 4 = 320$ votes. If Smith gives all his votes to himself, he is assured of a directorship. The reason is that Jones can't divide 320 votes among four candidates in such a way as to give all of them more than 80 votes, so Smith will finish fourth at worst.

In general, if there are N directors up for election, then $1/(N + 1)$ percent of the stock plus one share will guarantee you a seat. In our current example, this is $1/(4 + 1) = 20$ percent. So the more seats that are up for election at one time, the easier (and cheaper) it is to win one.

With **straight voting**, the directors are elected one at a time. Each time, Smith can cast 20 votes and Jones can cast 80. As a consequence, Jones will elect all of the candidates. The only way to guarantee a seat is to own 50 percent plus one share. This also guarantees that you will win every seat, so it's really all or nothing.

[6]The golden rule: Whosoever has the gold makes the rules.

[7]By minority participation, we mean participation by shareholders with relatively small amounts of stock.

EXAMPLE 6.8

Buying the Election

Stock in JRJ Corporation sells for $20 per share and features cumulative voting. There are 10,000 shares outstanding. If three directors are up for election, how much does it cost to ensure yourself a seat on the board?

The question here is how many shares of stock it will take to get a seat. The answer is 2,501, so the cost is 2,501 × $20 = $50,020. Why 2,501? Because there is no way the remaining 7,499 votes can be divided among three people to give all of them more than 2,501 votes. For example, suppose two people receive 2,502 votes and the first two seats. A third person can receive at most 10,000 − 2,502 − 2,502 − 2,501 = 2,495, so the third seat is yours.

As we've illustrated, straight voting can "freeze out" minority shareholders; that is the reason many states have mandatory cumulative voting. In states where cumulative voting is mandatory, devices have been worked out to minimize its impact.

One such device is to stagger the voting for the board of directors. With staggered elections, only a fraction of the directorships are up for election at a particular time. Thus, if only two directors are up for election at any one time, it will take 1/(2 + 1) = 33.33 percent of the stock plus one share to guarantee a seat.

Overall, staggering has two basic effects:

1. Staggering makes it more difficult for a minority to elect a director when there is cumulative voting because there are fewer directors to be elected at one time.
2. Staggering makes takeover attempts less likely to be successful because it makes it more difficult to vote in a majority of new directors.

We should note that staggering may serve a beneficial purpose. It provides "institutional memory," that is, continuity on the board of directors. This may be important for corporations with significant long-range plans and projects.

PROXY VOTING A **proxy** is the grant of authority by a shareholder to someone else to vote his/her shares. For convenience, much of the voting in large public corporations is actually done by proxy.

As we have seen, with straight voting, each share of stock has one vote. The owner of 10,000 shares has 10,000 votes. Large companies have hundreds of thousands or even millions of shareholders. Shareholders can come to the annual meeting and vote in person, or they can transfer their right to vote to another party.

Obviously, management always tries to get as many proxies as possible transferred to it. However, if shareholders are not satisfied with management, an "outside" group of shareholders can try to obtain votes via proxy. They can vote by proxy in an attempt to replace management by electing enough directors. The resulting battle is called a *proxy fight*.

CLASSES OF STOCK Some firms have more than one class of common stock. Often, the classes are created with unequal voting rights. The Ford Motor Company, for example, has Class B common stock, which is not publicly traded (it is held by Ford family interests and trusts). This class has 40 percent of the voting power, even though it represents less than 10 percent of the total number of shares outstanding.

There are many other cases of corporations with different classes of stock. For example, Adolph Coors Class B shares, which are owned by the public, have no votes at all except in the case of a merger. The CEO of cable TV giant Comcast, Brian Roberts, owns about

.4 percent of the company's equity, but he has a third of all the votes, thanks to a special class of stock. Another good example is Google, the Web search company, which only recently became publicly owned. Google has two classes of common stock, A and B. The Class A shares are held by the public, and each share has one vote. The Class B shares are held by company insiders, and each Class B share has 10 votes. As a result, Google's founders and management control the company.

Historically, the New York Stock Exchange did not allow companies to create classes of publicly traded common stock with unequal voting rights. Exceptions (e.g., Ford) appear to have been made. In addition, many non-NYSE companies have dual classes of common stock.

A primary reason for creating dual or multiple classes of stock has to do with control of the firm. If such stock exists, management of a firm can raise equity capital by issuing nonvoting or limited-voting stock while maintaining control.

The subject of unequal voting rights is controversial in the United States, and the idea of one share, one vote has a strong following and a long history. Interestingly, however, shares with unequal voting rights are quite common in the United Kingdom and elsewhere around the world.

OTHER RIGHTS The value of a share of common stock in a corporation is directly related to the general rights of shareholders. In addition to the right to vote for directors, shareholders usually have the following rights:

1. The right to share proportionally in dividends paid.
2. The right to share proportionally in assets remaining after liabilities have been paid in a liquidation.
3. The right to vote on stockholder matters of great importance, such as a merger. Voting is usually done at the annual meeting or a special meeting.

In addition, stockholders sometimes have the right to share proportionally in any new stock sold. This is called the *preemptive right*.

Essentially, a preemptive right means that a company that wishes to sell stock must first offer it to the existing stockholders before offering it to the general public. The purpose is to give a stockholder the opportunity to protect his/her proportionate ownership in the corporation.

DIVIDENDS A distinctive feature of corporations is that they have shares of stock on which they are authorized by law to pay dividends to their shareholders. Dividends paid to shareholders represent a return on the capital directly or indirectly contributed to the corporation by the shareholders. The payment of dividends is at the discretion of the board of directors.

Some important characteristics of dividends include the following:

1. Unless a dividend is declared by the board of directors of a corporation, it is not a liability of the corporation. A corporation cannot default on an undeclared dividend. As a consequence, corporations cannot become bankrupt because of nonpayment of dividends. The amount of the dividend and even whether it is paid are decisions based on the business judgment of the board of directors.
2. The payment of dividends by the corporation is not a business expense. Dividends are not deductible for corporate tax purposes. In short, dividends are paid out of the corporation's aftertax profits.
3. Dividends received by individual shareholders are taxable. However, corporations that own stock in other corporations are permitted to exclude 70 percent

of the dividend amounts they receive and are taxed only on the remaining 30 percent.[8]

Preferred Stock Features

Preferred stock differs from common stock because it has preference over common stock in the payment of dividends and in the distribution of corporation assets in the event of liquidation. *Preference* means only that the holders of the preferred shares must receive a dividend (in the case of an ongoing firm) before holders of common shares are entitled to anything.

Preferred stock is a form of equity from a legal and tax standpoint. It is important to note, however, that holders of preferred stock sometimes have no voting privileges.

STATED VALUE Preferred shares have a stated liquidating value, usually $100 per share. The cash dividend is described in terms of dollars per share. For example, Ford "$5 preferred" easily translates into a dividend yield of 5 percent of stated value.

CUMULATIVE AND NONCUMULATIVE DIVIDENDS A preferred dividend is *not* like interest on a bond. The board of directors may decide not to pay the dividends on preferred shares, and their decision may have nothing to do with the current net income of the corporation.

Dividends payable on preferred stock are either *cumulative* or *noncumulative;* most are cumulative. If preferred dividends are cumulative and are not paid in a particular year, they will be carried forward as an *arrearage*. Usually, both the accumulated (past) preferred dividends and the current preferred dividends must be paid before the common shareholders can receive anything.

Unpaid preferred dividends are *not* debts of the firm. Directors elected by the common shareholders can defer preferred dividends indefinitely. However, in such cases, common shareholders must also forgo dividends. In addition, holders of preferred shares are sometimes granted voting and other rights if preferred dividends have not been paid for some time.

IS PREFERRED STOCK REALLY DEBT? A good case can be made that preferred stock is really debt in disguise, a kind of equity bond. Preferred shareholders receive a stated dividend only, and, if the corporation is liquidated, preferred shareholders get a stated value. Often, preferred stocks carry credit ratings much like those of bonds. Furthermore, preferred stock is sometimes convertible into common stock, and preferred stocks are often callable. For example, in August 2007, Countrywide Financial sold about $2 billion in new preferred stock to Bank of America. The preferred stock was convertible into common stock that would give Bank of America a 19 percent ownership in Countrywide Financial.

In addition, many issues of preferred stock have obligatory sinking funds. The existence of such a sinking fund effectively creates a final maturity because it means that the entire issue will ultimately be retired. For these reasons, preferred stock seems to be a lot like debt. However, for tax purposes, preferred dividends are treated like common stock dividends.

In the 1990s, firms began to sell securities that look a lot like preferred stock but are treated as debt for tax purposes. The new securities were given interesting acronyms like TOPrS (trust-originated preferred securities, or toppers), MIPS (monthly income preferred securities), and QUIPS (quarterly income preferred securities), among others. Because of various specific features, these instruments can be counted as debt for tax purposes, making the interest payments tax deductible. Payments made to investors in these instruments are

[8]For the record, the 70 percent exclusion applies when the recipient owns less than 20 percent of the outstanding stock in a corporation. If a corporation owns more than 20 percent but less than 80 percent, the exclusion is 80 percent. If more than 80 percent is owned, the corporation can file a single "consolidated" return and the exclusion is effectively 100 percent.

treated as interest for personal income taxes for individuals. Until 2003, interest payments and dividends were taxed at the same marginal tax rate. When the tax rate on dividend payments was reduced, these instruments were not included, so individuals must still pay their higher income tax rate on dividend payments received from these instruments.

6.6 THE STOCK MARKETS

Back in Chapter 1, we briefly mentioned that shares of stock are bought and sold on various stock exchanges, the two most important of which (in the U.S.) are the New York Stock Exchange and the NASDAQ. From our earlier discussion, recall that the stock market consists of a **primary market** and a **secondary market**. In the primary, or new-issue market, shares of stock are first brought to the market and sold to investors. In the secondary market, existing shares are traded among investors.

In the primary market, companies sell securities to raise money. We will discuss this process in detail in a later chapter. We therefore focus mainly on secondary-market activity in this section. We conclude with a discussion of how stock prices are quoted in the financial press.

Dealers and Brokers

Because most securities transactions involve dealers and brokers, it is important to understand exactly what is meant by the terms *dealer* and *broker*. A **dealer** maintains an inventory and stands ready to buy and sell at any time. In contrast, a **broker** brings buyers and sellers together, but does not maintain an inventory. Thus, when we speak of used car dealers and real estate brokers, we recognize that the used car dealer maintains an inventory, whereas the real estate broker does not.

In the securities markets, a dealer stands ready to buy securities from investors wishing to sell them and sell securities to investors wishing to buy them. Recall from our previous chapter that the price the dealer is willing to pay is called the *bid price*. The price at which the dealer will sell is called the *ask price* (sometimes called the *asked*, *offered*, or *offering price*). The difference between the bid and ask prices is called the *spread*, and it is the basic source of dealer profits.

How big is the bid-ask spread on your favorite stock? Check out the latest quotes at www.bloomberg.com.

Dealers exist in all areas of the economy, not just the stock markets. For example, your local college bookstore is probably both a primary and a secondary market textbook dealer. If you buy a new book, this is a primary market transaction. If you buy a used book, this is a secondary market transaction, and you pay the store's ask price. If you sell the book back, you receive the store's bid price, often half of the ask price. The bookstore's spread is the difference between the two prices.

In contrast, a securities broker arranges transactions between investors, matching investors wishing to buy securities with investors wishing to sell securities. The distinctive characteristic of security brokers is that they do not buy or sell securities for their own accounts. Facilitating trades by others is their business.

Organization of the NYSE

The New York Stock Exchange, or NYSE, popularly known as the Big Board, celebrated its bicentennial a few years ago. It has occupied its current location on Wall Street since the turn of the twentieth century. Measured in terms of dollar volume of activity and the total value of shares listed, it is the largest stock market in the world.

MEMBERS Historically, the NYSE had 1,366 exchange members. Prior to 2006, the exchange members were said to own "seats" on the exchange, and, collectively, the members of the exchange were also the owners. For this and other reasons, seats were valuable and were bought and sold fairly regularly. Seat prices reached a record $4 million in 2005.

In 2006, all of this changed when the NYSE became a publicly owned corporation called NYSE Group, Inc. Naturally, its stock is listed on the NYSE. Now, instead of purchasing seats, exchange members must purchase trading licenses, the number of which is limited to 1,500. In 2010, a license would set you back a cool $40,000—per year. Having a license entitles you to buy and sell securities on the floor of the exchange. Different members play different roles in this regard.

The largest number of NYSE members are registered as **commission brokers**. The business of a commission broker is to execute customer orders to buy and sell stocks. A commission broker's primary responsibility to customers is to get the best possible prices for their orders. The exact number varies, but, usually, about 500 NYSE members are commission brokers. NYSE commission brokers typically are employees of brokerage companies such as Merrill Lynch.

Second in number of NYSE members are **specialists**, so named because each of them acts as an assigned dealer for a small set of securities. With a few exceptions, each security listed for trading on the NYSE is assigned to a single specialist. Specialists are also called "market makers" because they are obligated to maintain a fair, orderly market for the securities assigned to them.

Specialists post bid prices and ask prices for securities assigned to them. Specialists make a market by standing ready to buy at bid prices and sell at asked prices when there is a temporary disparity between the flow of buy orders and that of sell orders for a security. In this capacity, they act as dealers for their own accounts.

Third in number of exchange members are **floor brokers**. Floor brokers are used by commission brokers who are too busy to handle certain orders themselves. Such commission brokers will delegate some orders to floor brokers for execution. Floor brokers are sometimes called $2 brokers, a name earned at a time when the standard fee for their service was only $2.

In recent years, floor brokers have become less important on the exchange floor because of the efficient **SuperDOT system** (the *DOT* stands for Designated Order Turnaround), which allows orders to be transmitted electronically directly to the specialist. SuperDOT trading now accounts for a substantial percentage of all trading on the NYSE, particularly on smaller orders.

Finally, a small number of NYSE members are **floor traders** who independently trade for their own accounts. Floor traders try to anticipate temporary price fluctuations and profit from them by buying low and selling high. In recent decades, the number of floor traders has declined substantially, suggesting that it has become increasingly difficult to profit from short-term trading on the exchange floor.

OPERATIONS Now that we have a basic idea of how the NYSE is organized and who the major players are, we turn to the question of how trading actually takes place. Fundamentally, the business of the NYSE is to attract and process **order flow**. The term *order flow* means the flow of customer orders to buy and sell stocks. The customers of the NYSE are the millions of individual investors and tens of thousands of institutional investors who place their orders to buy and sell shares in NYSE-listed companies. The NYSE has been quite successful in attracting order flow. Currently, it is not unusual for well over a billion shares to change hands in a single day.

FLOOR ACTIVITY It is quite likely that you have seen footage of the NYSE trading floor on television, or you may have visited the NYSE and viewed exchange floor activity from the visitors' gallery. Either way, you would have seen a big room, about the size of a basketball gym. This big room is called, technically, "the Big Room." There are a few other, smaller rooms that you normally don't see, one of which is called "the Garage" because that is what it was before it was taken over for trading.

Take a virtual field trip to the New York Stock Exchange at www.nyse.com.

On the floor of the exchange are a number of stations, each with a roughly figure-eight shape. These stations have multiple counters with numerous terminal screens above and on the sides. People operate behind and in front of the counters in relatively stationary positions.

Other people move around on the exchange floor, frequently returning to the many telephones positioned along the exchange walls. In all, you may be reminded of worker ants moving around an ant colony. It is natural to wonder: "What are all those people doing down there (and why are so many wearing funny-looking coats)?"

As an overview of exchange floor activity, here is a quick look at what goes on. Each of the counters at a figure-eight–shaped station is a **specialist's post**. Specialists normally operate in front of their posts to monitor and manage trading in the stocks assigned to them. Clerical employees working for the specialists operate behind the counter. Moving from the many telephones lining the walls of the exchange out to the exchange floor and back again are swarms of commission brokers, receiving telephoned customer orders, walking out to specialists' posts where the orders can be executed, and returning to confirm order executions and receive new customer orders.

To better understand activity on the NYSE trading floor, imagine yourself as a commission broker. Your phone clerk has just handed you an order to sell 20,000 shares of Walmart for a customer of the brokerage company that employs you. The customer wants to sell the stock at the best possible price as soon as possible. You immediately walk (running violates exchange rules) to the specialist's post where Walmart stock is traded.

As you approach the specialist's post where Walmart is traded, you check the terminal screen for information on the current market price. The screen reveals that the last executed trade was at $60.25 and that the specialist is bidding $60 per share. You could immediately sell to the specialist at $60, but that would be too easy.

Instead, as the customer's representative, you are obligated to get the best possible price. It is your job to "work" the order, and your job depends on providing satisfactory order execution service. So, you look around for another broker who represents a customer who wants to buy Walmart stock. Luckily, you quickly find another broker at the specialist's post with an order to buy 20,000 shares. Noticing that the dealer is asking $60.10 per share, you both agree to execute your orders with each other at a price of $60.05. This price is exactly halfway between the specialist's bid and ask prices, and it saves each of your customers $.05 \times 20{,}000 = \$1{,}000$ as compared to dealing at the posted prices.

For a very actively traded stock, there may be many buyers and sellers around the specialist's post, and most of the trading will be done directly between brokers. This is called trading in the "crowd." In such cases, the specialist's responsibility is to maintain order and to make sure that all buyers and sellers receive a fair price. In other words, the specialist essentially functions as a referee.

More often, however, there will be no crowd at the specialist's post. Going back to our Walmart example, suppose you are unable to quickly find another broker with an order to buy 20,000 shares. Because you have an order to sell immediately, you may have no choice but to sell to the specialist at the bid price of $60. In this case, the need to execute an order quickly takes priority, and the specialist provides the liquidity necessary to allow immediate order execution.

Finally, note that colored coats are worn by many of the people on the floor of the exchange. The color of the coat indicates the person's job or position. Clerks, runners, visitors, exchange officials, and so on wear particular colors to identify themselves. Also, things can get a little hectic on a busy day, with the result that good clothing doesn't last long; the cheap coats offer some protection.

NASDAQ Operations

In terms of total dollar volume of trading, the second largest stock market in the United States is NASDAQ (say "Naz-dak"). The somewhat odd name originally was an acronym for the

National Association of Securities Dealers Automated Quotations system, but NASDAQ is now a name in its own right.

Introduced in 1971, the NASDAQ market is a computer network of securities dealers and others that disseminates timely security price quotes to computer screens worldwide. NASDAQ dealers act as market makers for securities listed on NASDAQ. As market makers, NASDAQ dealers post bid and ask prices at which they accept sell and buy orders, respectively. With each price quote, they also post the number of stock shares that they obligate themselves to trade at their quoted prices.

Like NYSE specialists, NASDAQ market makers trade on an inventory basis, that is, using their inventory as a buffer to absorb buy and sell order imbalances. Unlike the NYSE specialist system, NASDAQ features multiple market makers for actively traded stocks. Thus, there are two key differences between the NYSE and NASDAQ:

1. NASDAQ is a computer network and has no physical location where trading takes place.
2. NASDAQ has a multiple market maker system rather than a specialist system.

Traditionally, a securities market largely characterized by dealers who buy and sell securities for their own inventories is called an **over-the-counter (OTC) market**. Consequently, NASDAQ is often referred to as an OTC market. However, in their efforts to promote a distinct image, NASDAQ officials prefer that the term OTC not be used when referring to the NASDAQ market. Nevertheless, old habits die hard, and many people still refer to NASDAQ as an OTC market.

By 2008, the NASDAQ had grown to the point that it was, by some measures, as big (or bigger) as the NYSE. For example, on January 22, 2010, 2.87 billion shares were traded on the NASDAQ versus 1.49 billion on the NYSE. In dollars, NASDAQ trading volume for the day was $68.33 billion compared to $39.78 billion for the NYSE.

NASDAQ (www.nasdaq.com) has a *great* Web site; check it out!

The NASDAQ is actually made up of three separate markets: the NASDAQ Global Select Market, the NASDAQ Global Market, and the NASDAQ Capital Market. As the market for NASDAQ's larger and more actively traded securities, the Global Select Market lists about 1,200 companies (as of early 2010), including some of the best-known companies in the world, such as Microsoft and Intel. The NASDAQ Global Market companies are somewhat smaller in size, and NASDAQ lists about 1,450 of them. Finally, the smallest companies listed on NASDAQ are in the NASDAQ Capital Market; about 550 or so are currently listed. Of course, as Capital Market companies become more established, they may move up to the Global Market or Global Select Market.

ECNs In a very important development in the late 1990s, the NASDAQ system was opened to so-called **electronic communications networks (ECNs)**. ECNs are basically Web sites that allow investors to trade directly with one another. Investor buy and sell orders placed on ECNs are transmitted to the NASDAQ and displayed along with market maker bid and ask prices. As a result, the ECNs open up the NASDAQ by essentially allowing individual investors, not just market makers, to enter orders. As a result, the ECNs act to increase liquidity and competition.

Of course, the NYSE and NASDAQ are not the only places stocks are traded. See our nearby *The Real World* box for a discussion of somewhat wilder markets.

Stock Market Reporting

You can get real-time stock quotes on the Web. See finance.yahoo.com for details.

In recent years, the reporting of stock prices and related information has increasingly moved from traditional print media, such as *The Wall Street Journal*, to various Web sites. Yahoo! Finance (finance.yahoo.com) is a good example. We went there and requested a

THE WILD, WILD WEST OF STOCK TRADING

Where do companies go when they can't (or don't want to) meet the listing requirements of the larger stock markets? Two options are the Over-the-Counter Bulletin Board (OTCBB) and the Pink Sheets. These two electronic markets are part of the Wild, Wild West of stock trading. The somewhat odd names have simple explanations. The OTCBB began as an electronic bulletin board that was created to facilitate OTC trading in nonlisted stocks. The name "Pink Sheets" just reflects the fact that, at one time, prices for such stocks were quoted on pink sheets of paper.

The well-known markets such as NASDAQ and the NYSE have relatively strict listing requirements. If a company fails to meet these requirements, it can be delisted. The OTCBB and the Pink Sheets, on the other hand, have no listing requirements. The OTCBB does require that companies file financial statements with the SEC (or other relevant agency), but the Pink Sheets does not.

Stocks traded on these markets often have very low prices and are frequently referred to as "penny stocks," "microcaps," or even "nanocaps." Relatively few brokers do any research on these companies, so information is often spread through word of mouth or the Internet, not the most reliable of sources. In fact, for many stocks, these markets often look like big electronic rumor mills and gossip factories. To get a feel for what trading looks like, we captured a typical screen from the OTCBB Web site (www.otcbb.com):

Market Statistics — Data delayed 15-20 minutes

OTCBB | Vol Actives | GO

Name	Symbol	Last	Tick	Chg	% Chg	Open	High	Low	Volume
Cord Blood America Inc.	CBAI	0.0107	▲	0.0017	18.89%	0.0093	0.012	0.0087	386.56 m
Greenshift Corp.	GERS	0.0003	–	0.00	0.00%	0.0004	0.0004	0.0003	166.18 m
Cyberlux Corp.	CYBL	0.0003	–	0.00	0.00%	0.0003	0.0003	0.0002	137.22 m
Unico Inc.	UNCO	0.0004	▼	-0.0001	-20.00%	0.0005	0.0006	0.0004	65.09 m
Zevotek Inc.	ZVTK	0.005	▼	-0.0005	-9.09%	0.0056	0.0057	0.0048	51.4 m
Medefile International Inc.	MDFI	0.0106	▼	-0.0024	-18.46%	0.0131	0.014	0.01	35.96 m
Camelot Entertainment Group Inc. NEW	CMGR	0.0003	▲	0.0001	50.00%	0.0003	0.0003	0.0002	35.56 m
Wentworth Energy Inc.	WNWG	0.0031	▲	0.0008	34.78%	0.0024	0.0045	0.0023	24.0 m
Angel Acquisition Corp.	AGEL	0.0001	–	0.00	0.00%	0.0001	0.0001	0.0001	20.85 m
IDO Security Inc.	IDOI	0.0032	▼	-0.0001	-3.03%	0.0033	0.0033	0.003	15.83 m

stock quote on wholesale club Costco, which is listed on the NASDAQ. Here is a portion of what we found:

Costco Wholesale Corporation (NasdaqGS: COST)
After Hours: 57.9773 ↑ 0.05 (0.08%) 4:30pm ET

Last Trade:	57.93	Day's Range:	57.14 - 58.48
Trade Time:	4:00pm ET	52wk Range:	38.17 - 61.25
Change:	↑ 0.38 (0.66%)	Volume:	3,530,432
Prev Close:	57.55	Avg Vol (3m):	3,197,940
Open:	57.23	Market Cap:	25.45B
Bid:	57.78 x 3000	P/E (ttm):	23.46
Ask:	58.08 x 3000	EPS (ttm):	2.47
1y Target Est:	63.39	Div & Yield:	0.72 (1.30%)

Market Statistics

Data delayed 15-20 minutes

OTCBB | % Gainers | GO

Name	Symbol	Last	Tick	Chg	% Chg	Open	High	Low	Volume
Cyberspace Vita Inc. New	CYVA	0.75	▲	0.735	4,900.00%	0.75	0.75	0.75	2.5 k
DigitalTown Inc.	DGTW	1.25	▲	0.96	331.03%	1.24	1.25	1.24	2.4 k
First Standard Bank	FSTA	3.50	▲	2.50	250.00%	3.50	3.50	3.50	150
Pinnacle Bank of Oregon	PNNB	0.036	▲	0.0249	224.32%	0.036	0.036	0.036	2.0 k
Tempco Inc.	TEMO	0.25	▲	0.17	212.50%	0.12	0.30	0.12	16.39 k
Imagine Media Ltd.	IMLE	0.85	▲	0.54	174.19%	0.30	0.85	0.25	125.0 k
Deltron Inc.	DTRO	1.00	▲	0.63	170.27%	0.385	1.00	0.385	7.5 k
BioCurex Inc . Warrants expiring 01/19/2015	BOCXW	0.03	▲	0.018	150.00%	0.03	0.03	0.03	13.0 k
Thrive World Wide Inc.	TWWI	0.07	▲	0.04	133.33%	0.07	0.07	0.07	2.0 k
Kreido Biofuels Inc.	KRBF	0.01	▲	0.0055	122.22%	0.01	0.01	0.01	10.0 k

First, take a look at the returns. Cyberspace Vita, Inc. had a return for the day of 4,900 percent! That's not something you see very often. Of course, the big return was generated with a whopping price increase of $0.735 per share. A stock listed on the OTCBB is often the most actively traded stock on any particular day. For example, by the end of this particular day, Apple was the most active stock on NASDAQ, trading about 67 million shares. Three stocks on the OTCBB traded even more shares. Cord Blood America led the way with slightly over 386 million shares traded. But, at an average price of, say $0.01 per share, the total dollar volume in Cord Blood America was all of $3.865 million. In contrast, trades in Apple amounted to about $13.7 billion.

The Pink Sheets (www.pinksheets.com) is operated by a privately owned company. To be listed on the Pink Sheets, a company just has to find a market maker willing to trade in the company's stock. Companies list on the Pink Sheets for various reasons. Small companies that do not wish to meet listing requirements are one type. Another is foreign companies that often list on the Pink Sheets because they do not prepare their financial statements according to GAAP, a requirement for listing on U.S. stock exchanges. There are many companies that were formerly listed on bigger stock markets that were either delisted involuntarily or chose to "go dark" for various reasons, including, as we discussed in Chapter 1, the costs associated with Sarbox compliance.

All in all, the OTCBB and Pink Sheets can be pretty wild places to trade. Low stock prices allow for huge percentage returns on small stock price movements. Be advised, however, that attempts at manipulation and fraud are commonplace. Also, stocks on these markets are often thinly traded, meaning there is little volume. It is not unusual for a stock listed on either market to have no trades on a given day. Even two or three days in a row without a trade in a particular stock is not uncommon.

Most of this information is self-explanatory. The most recent reported trade took place at 4:00 p.m. for $57.93. The reported change is from the previous day's closing price. The opening price is the first trade of the day. We see the bid and ask prices of $57.78 and $58.08, respectively, along with the market "depth," which is the number of shares sought at the bid price and offered at the ask price. The "1y Target Est" is the average estimated stock price one year ahead based on estimates from security analysts who follow the stock.

Moving to the second column, we have the range of prices for this day, followed by the range over the previous 52 weeks. Volume is the number of shares traded today, followed by average daily volume over the last three months. Market cap is the number of shares outstanding (from the most recent quarterly financial statements) multiplied by the current price per share. P/E is the PE ratio we discussed in Chapter 3. The earnings per share (EPS) used in the calculation is "ttm," meaning "trailing twelve months." Finally, we have the dividend on the stock, which is actually the most recent quarterly dividend multiplied by 4, and the dividend yield. Notice that the yield is just the reported dividend divided by the stock price: $0.72/$57.55 = .013 = 1.3%.

SUMMARY AND CONCLUSIONS

This chapter has covered the basics of stocks and stock valuations. The key points include:

1. A stock can be valued by discounting its dividends. We mention three types of situations:
   a. The case of zero growth of dividends.
   b. The case of constant growth of dividends.
   c. The case of differential growth.
2. An estimate of the growth rate of a stock is needed for the dividend discount model. A useful estimate of the growth rate is

   g = Retention ratio × Return on retained earnings (ROE)
3. It is worthwhile to view a share of stock as the sum of its worth—if the company behaves like a cash cow (the company does no investing)—and the value per share of its growth opportunities. We write the value of a share as

   $$\frac{\text{EPS}}{R} + \text{NPVGO}$$

   We show that, in theory, share prices must be the same whether the dividend growth model or the above formula is used.
4. From accounting, we know that earnings are divided into two parts: dividends and retained earnings. Most firms continually retain earnings in order to create future dividends. One should not discount earnings to obtain price per share since part of earnings must be reinvested. Only dividends reach the stockholders and only they should be discounted to obtain share price.
5. We suggest that a firm's price-earnings ratio is a function of three factors:
   a. The per-share amount of the firm's valuable growth opportunities.
   b. The risk of the stock.
   c. The type of accounting method used by the firm.
6. As the owner of shares of common stock in a corporation, you have various rights, including the right to vote to elect corporate directors. Voting in corporate elections can be either cumulative or straight. Most voting is actually done by proxy, and a proxy battle breaks out when competing sides try to gain enough votes to have their candidates for the board elected.
7. In addition to common stock, some corporations have issued preferred stock. The name stems from the fact that preferred stockholders must be paid first, before common stockholders can receive anything. Preferred stock has a fixed dividend.
8. The two biggest stock markets in the United States are the NYSE and the NASDAQ. We discussed the organization and operation of these two markets, and we saw how stock price information is reported.

CONCEPT QUESTIONS

1. **Stock Valuation** Why does the value of a share of stock depend on dividends?
2. **Stock Valuation** A substantial percentage of the companies listed on the NYSE and the NASDAQ don't pay dividends, but investors are nonetheless willing to buy shares in them. How is this possible given your answer to the previous question?

3. **Dividend Policy** Referring to the previous questions, under what circumstances might a company choose not to pay dividends?
4. **Dividend Growth Model** Under what two assumptions can we use the dividend growth model presented in the chapter to determine the value of a share of stock? Comment on the reasonableness of these assumptions.
5. **Common versus Preferred Stock** Suppose a company has a preferred stock issue and a common stock issue. Both have just paid a $2 dividend. Which do you think will have a higher price, a share of the preferred or a share of the common?
6. **Dividend Growth Model** Based on the dividend growth model, what are the two components of the total return on a share of stock? Which do you think is typically larger?
7. **Growth Rate** In the context of the dividend growth model, is it true that the growth rate in dividends and the growth rate in the price of the stock are identical?
8. **Price-Earnings Ratio** What are the three factors that determine a company's price-earnings ratio?
9. **Voting Rights** When it comes to voting in elections, what are the differences between U.S. political democracy and U.S. corporate democracy?
10. **Corporate Ethics** Is it unfair or unethical for corporations to create classes of stock with unequal voting rights?
11. **Voting Rights** Some companies, such as Reader's Digest, have created classes of stock with no voting rights at all. Why would investors buy such stock?
12. **Stock Valuation** Evaluate the following statement: Managers should not focus on the current stock value because doing so will lead to an overemphasis on short-term profits at the expense of long-term profits.

QUESTIONS AND PROBLEMS

Basic
(Questions 1–9)

1. **Stock Values** The Starr Co. just paid a dividend of $2.15 per share on its stock. The dividends are expected to grow at a constant rate of 4 percent per year, indefinitely. If investors require a 12 percent return on the stock, what is the current price? What will the price be in three years? In 15 years?
2. **Stock Values** The next dividend payment by ZYX, Inc., will be $2.85 per share. The dividends are anticipated to maintain a 4.5 percent growth rate, forever. If ZYX stock currently sells for $84 per share, what is the required return?
3. **Stock Values** For the company in the previous problem, what is the dividend yield? What is the expected capital gains yield?
4. **Stock Values** Mickelson Corporation will pay a $2.90 per share dividend next year. The company pledges to increase its dividend by 4.75 percent per year, indefinitely. If you require an 11 percent return on your investment, how much will you pay for the company's stock today?
5. **Stock Valuation** Shelter, Inc., is expected to maintain a constant 5.2 percent growth rate in its dividends, indefinitely. If the company has a dividend yield of 4.4 percent, what is the required return on the company's stock?
6. **Stock Valuation** Suppose you know that a company's stock currently sells for $73 per share and the required return on the stock is 12 percent. You also know that the total return on the stock is evenly divided between a capital gains yield and a dividend yield. If it's the company's policy to always maintain a constant growth rate in its dividends, what is the current dividend per share?

7. **Stock Valuation** Gruber Corp. pays a constant $14 dividend on its stock. The company will maintain this dividend for the next eight years and will then cease paying dividends forever. If the required return on this stock is 11 percent, what is the current share price?
8. **Valuing Preferred Stock** Oberholser, Inc., has an issue of preferred stock outstanding that pays a $4.70 dividend every year, in perpetuity. If this issue currently sells for $103 per share, what is the required return?
9. **Growth Rate** The newspaper reported last week that Lowery Enterprises earned $30 million this year. The report also stated that the firm's return on equity is 14 percent. Lowery retains 70 percent of its earnings. What is the firm's earnings growth rate? What will next year's earnings be?

Intermediate (Questions 10–28)

10. **Stock Valuation** Universal Laser, Inc., just paid a dividend of $2.40 on its stock. The growth rate in dividends is expected to be a constant 5 percent per year, indefinitely. Investors require a 16 percent return on the stock for the first three years, a 14 percent return for the next three years, and then an 11 percent return thereafter. What is the current share price for the stock?
11. **Nonconstant Growth** Metallica Bearings, Inc., is a young start-up company. No dividends will be paid on the stock over the next 12 years, because the firm needs to plow back its earnings to fuel growth. The company will pay an $11 per share dividend in 13 years and will increase the dividend by 5.5 percent per year thereafter. If the required return on this stock is 13 percent, what is the current share price?
12. **Nonconstant Dividends** Osbourne, Inc., has an odd dividend policy. The company has just paid a dividend of $12 per share and has announced that it will increase the dividend by $3 per share for each of the next five years, and then never pay another dividend. If you require a 13 percent return on the company's stock, how much will you pay for a share today?
13. **Nonconstant Dividends** South Side Corporation is expected to pay the following dividends over the next four years: $10, $8, $5, and $3. Afterward, the company pledges to maintain a constant 5 percent growth rate in dividends forever. If the required return on the stock is 13 percent, what is the current share price?
14. **Differential Growth** Hughes Co. is growing quickly. Dividends are expected to grow at a 30 percent rate for the next three years, with the growth rate falling off to a constant 7 percent thereafter. If the required return is 10 percent and the company just paid a $2.40 dividend, what is the current share price?
15. **Differential Growth** Janicek Corp. is experiencing rapid growth. Dividends are expected to grow at 27 percent per year during the next three years, 17 percent over the following year, and then 7 percent per year indefinitely. The required return on this stock is 12 percent, and the stock currently sells for $65 per share. What is the projected dividend for the coming year?
16. **Negative Growth** Antiques R Us is a mature manufacturing firm. The company just paid a $12 dividend, but management expects to reduce the payout by 4 percent per year, indefinitely. If you require a 9 percent return on this stock, what will you pay for a share today?
17. **Finding the Dividend** Mustaine Corporation stock currently sells for $57.25 per share. The market requires an 11 percent return on the firm's stock. If the company maintains a constant 5 percent growth rate in dividends, what was the most recent dividend per share paid on the stock?
18. **Valuing Preferred Stock** Fifth National Bank just issued some new preferred stock. The issue will pay a $10 annual dividend in perpetuity, beginning 10 years from now. If the market requires a 6 percent return on this investment, how much does a share of preferred stock cost today?
19. **Using Stock Quotes** You have found the following stock quote for RJW Enterprises, Inc., in the financial pages of today's newspaper. What is the annual dividend? What was the closing price for this stock that appeared in *yesterday's* paper? If the company currently has 25 million shares of stock outstanding, what was net income for the most recent four quarters?

YTD %CHG	STOCK	SYM	YLD	PE	LAST	NET CHG
8.6	RJW Enterp.	RJW	2.4	26	24.90	0.13

20. **Taxes and Stock Price** You own $100,000 worth of Smart Money stock. One year from now, you will receive a dividend of $1.80 per share. You will receive a $2.20 dividend two years from now. You will sell the stock for $75 per share three years from now. Dividends are taxed at the rate of 28 percent. Assume there is no capital gains tax. The required aftertax rate of return is 9 percent. How many shares of stock do you own?

21. **Nonconstant Growth and Quarterly Dividends** Pasqually Mineral Water, Inc., will pay a quarterly dividend per share of $0.80 at the end of each of the next 12 quarters. Thereafter, the dividend will grow at a quarterly rate of 1.2 percent, forever. The appropriate rate of return on the stock is 10 percent, compounded quarterly. What is the current stock price?

22. **Finding the Dividend** Johnson, Inc., is expected to pay equal dividends at the end of each of the next two years. Thereafter, the dividend will grow at a constant annual rate of 4.5 percent, forever. The current stock price is $43. What is next year's dividend payment if the required rate of return is 11 percent?

23. **Finding the Required Return** Pre Satellite Corporation earned $12 million for the fiscal year ending yesterday. The firm also paid out 40 percent of its earnings as dividends yesterday. The firm will continue to pay out 40 percent of its earnings as annual, end-of-year dividends. The remaining 60 percent of earnings is retained by the company for use in projects. The company has 2 million shares of common stock outstanding. The current stock price is $85. The historical return on equity (ROE) of 14 percent is expected to continue in the future. What is the required rate of return on the stock?

24. **Dividend Growth** Four years ago, Bling Diamond, Inc., paid a dividend of $1.70 per share. Bling paid a dividend of $2.43 per share yesterday. Dividends will grow over the next five years at the same rate they grew over the last four years. Thereafter, dividends will grow at 5 percent per year. What will Bling Diamond's cash dividend be in seven years?

25. **Price-Earnings Ratio** Consider Pacific Energy Company and U.S. Bluechips, Inc., both of which reported earnings of $1,100,000. Without new projects, both firms will continue to generate earnings of $1,100,000 in perpetuity. Assume that all earnings are paid as dividends and that both firms require a 12 percent rate of return.
    a. What is the current PE ratio for each company?
    b. Pacific Energy Company has a new project that will generate additional earnings of $220,000 each year in perpetuity. Calculate the new PE ratio of the company.
    c. U.S. Bluechips has a new project that will increase earnings by $440,000 in perpetuity. Calculate the new PE ratio of the firm.

26. **Growth Opportunities** The Stambaugh Corporation currently has earnings per share of $7.50. The company has no growth and pays out all earnings as dividends. It has a new project which will require an investment of $1.10 per share in one year. The project is only a two-year project, and it will increase earnings in the two years following the investment by $2.30 and $2.60, respectively. Investors require an 11 percent return on Stambaugh stock.
    a. What is the value per share of the company's stock assuming the firm does not undertake the investment opportunity?
    b. If the company does undertake the investment, what is the value per share now?
    c. Again, assume the company undertakes the investment. What will the price per share be four years from today?

27. **Growth Opportunities** Rite Bite Enterprises sells toothpicks. Gross revenues last year were $8 million, and total costs were $3.6 million. Rite Bite has 1 million shares of common stock outstanding. Gross revenues and costs are expected to grow at 5 percent per year. Rite Bite pays no income taxes. All earnings are paid out as dividends.

    a. If the appropriate discount rate is 13 percent and all cash flows are received at year's end, what is the price per share of Rite Bite stock?

    b. Rite Bite has decided to produce toothbrushes. The project requires an immediate outlay of $3 million. In one year, another outlay of $4 million will be needed. The year after that, earnings will increase by $2 million. That profit level will be maintained in perpetuity. What is the new price per share of the stock?

28. **Growth Opportunities** California Real Estate, Inc., expects to earn $75 million per year in perpetuity if it does not undertake any new projects. The firm has an opportunity to invest $9 million today and $5 million in one year in real estate. The new investment will generate annual earnings of $8 million in perpetuity, beginning two years from today. The firm has 14 million shares of common stock outstanding, and the required rate of return on the stock is 12 percent. Land investments are not depreciable. Ignore taxes.

    a. What is the price of a share of stock if the firm does not undertake the new investment?

    b. What is the value of the investment?

    c. What is the per-share stock price if the firm undertakes the investment?

Challenge (Questions 29–34)

29. **Growth Opportunities** The annual earnings of Avalanche Skis, Inc., will be $9 per share in perpetuity if the firm makes no new investments. Under such a situation, the firm would pay out all of its earnings as dividends. Assume the first dividend will be received exactly one year from now.

    Alternatively, assume that three years from now, and in every subsequent year in perpetuity, the company can invest 30 percent of its earnings in new projects. Each project will earn 15 percent at year-end in perpetuity. The firm's discount rate is 11 percent.

    a. What is the price per share of Avalanche Skis, Inc., stock today without the company making the new investment?

    b. If Avalanche announces that the new investment will be made, what will the per-share stock price be today?

30. **Capital Gains versus Income** Consider four different stocks, all of which have a required return of 17 percent and a most recent dividend of $4.50 per share. Stocks W, X, and Y are expected to maintain constant growth rates in dividends for the foreseeable future of 10 percent, 0 percent, and −5 percent per year, respectively. Stock Z is a growth stock that will increase its dividend by 30 percent for the next two years and then maintain a constant 8 percent growth rate thereafter. What is the dividend yield for each of these four stocks? What is the expected capital gains yield? Discuss the relationship among the various returns that you find for each of these stocks.

31. **Stock Valuation** Most corporations pay quarterly dividends on their common stock rather than annual dividends. Barring any unusual circumstances during the year, the board raises, lowers, or maintains the current dividend once a year and then pays this dividend out in equal quarterly installments to its shareholders.

    a. Suppose a company currently pays a $2.80 annual dividend on its common stock in a single annual installment, and management plans on raising this dividend by 5 percent per year indefinitely. If the required return on this stock is 13 percent, what is the current share price?

    b. Now suppose that the company in (a) actually pays its annual dividend in equal quarterly installments; thus, this company has just paid a $0.70 dividend per share, as it has for the previous three quarters. What is your value for the current share price now? (Hint: Find the equivalent annual end-of-year dividend for each year.) Comment on whether or not you think that this model of stock valuation is appropriate.

32. **Growth Opportunities** Lewin Skis, Inc., (today) expects to earn $7.50 per share for each of the future operating periods (beginning at time 1) if the firm makes no new investments and returns the earnings as dividends to the shareholders. However, Clint Williams, president and CEO, has discovered an opportunity to retain and invest 25 percent of the earnings beginning three years from today. This opportunity to invest will continue for each period indefinitely. He expects to earn 11 percent on this new equity investment, the return beginning one year after each investment is made. The firm's equity discount rate is 13 percent throughout.
    a. What is the price per share of Lewin Skis, Inc., stock without making the new investment?
    b. If the new investment is expected to be made, per the preceding information, what would the price of the stock be now?
    c. Suppose the company could increase the investment in the project by whatever amount it chose. What would the retention ratio need to be to make this project attractive?
33. **Nonconstant Growth** Storico Co. just paid a dividend of $3.90 per share. The company will increase its dividend by 16 percent next year and will then reduce its dividend growth rate by 4 percentage points per year until it reaches the industry average of 4 percent dividend growth, after which the company will keep a constant growth rate forever. If the required return on Storico stock is 12 percent, what will a share of stock sell for today?
34. **Nonconstant Growth** This one's a little harder. Suppose the current share price for the firm in the previous problem is $73.05 and all the dividend information remains the same. What required return must investors be demanding on Storico stock? (Hint: Set up the valuation formula with all the relevant cash flows, and use trial and error to find the unknown rate of return.)

WHAT'S ON THE WEB?

1. **Dividend Discount Model** According to the 2009 Value Line *Investment Survey*, the dividend growth for ConocoPhillips (COP) is 3 percent. Find the current price quote and dividend information at finance.yahoo.com. If the growth rate given in the Value Line *Investment Survey* is correct, what is the required return for ConocoPhillips? Does this number make sense to you?
2. **Market Operations** How does a stock trade take place? Go to www.nyse.com and click on "The Trading Floor" and find the discussion of how trades take place. Summarize the trading process.

CLOSING CASE

STOCK VALUATION AT RAGAN ENGINES

Larissa has been talking with the company's directors about the future of East Coast Yachts. To this point, the company has used outside suppliers for various key components of the company's yachts, including engines. Larissa has decided that East Coast Yachts should consider the purchase of an engine manufacturer to allow East Coast Yachts to better integrate its supply chain and get more control over engine features. After investigating several possible companies, Larissa feels that the purchase of Ragan Engines, Inc., is a possibility. She has asked Dan Ervin to analyze Ragan's value.

Ragan Engines, Inc., was founded nine years ago by a brother and sister—Carrington and Genevieve Ragan—and has remained a privately owned company. The company manufactures marine engines for a variety of applications. Ragan has experienced rapid growth because of a proprietary technology that increases the fuel efficiency of its engines with very little sacrifice in performance. The company is equally owned by Carrington and Genevieve. The original agreement between the siblings gave each 125,000 shares of stock.

Larissa has asked Dan to determine a value per share of Ragan stock. To accomplish this, Dan has gathered the following information about some of Ragan's competitors that are publicly traded:

	EPS	DPS	STOCK PRICE	ROE	R
Blue Ribband Motors Corp.	$1.15	$0.34	$18.25	13.00%	15.00%
Bon Voyage Marine, Inc.	1.45	0.42	15.31	16.00	18.00
Nautilus Marine Engines	(0.21)	0.60	28.72	N/A	14.00
Industry average	$0.80	$0.45	$20.76	14.50%	15.67%

Nautilus Marine Engines' negative earnings per share (EPS) were the result of an accounting write-off last year. Without the write-off, EPS for the company would have been $1.85. Last year, Ragan had an EPS of $4.20 and paid a dividend to Carrington and Genevieve of $157,500 each. The company also had a return on equity of 20 percent. Larissa tells Dan that a required return for Ragan of 16 percent is appropriate.

1. Assuming the company continues its current growth rate, what is the value per share of the company's stock?
2. Dan has examined the company's financial statements, as well as examining those of its competitors. Although Ragan currently has a technological advantage, Dan's research indicates that Ragan's competitors are investigating other methods to improve efficiency. Given this, Dan believes that Ragan's technological advantage will last only for the next five years. After that period, the company's growth will likely slow to the industry average. Additionally, Dan believes that the required return the company uses is too high. He believes the industry average required return is more appropriate. Under Dan's assumptions, what is the estimated stock price?
3. What is the industry average price-earnings ratio? What is Ragan's price-earnings ratio? Comment on any differences and explain why they may exist.
4. Assume the company's growth rate declines to the industry average after five years. What percentage of the stock's value is attributable to growth opportunities?
5. Assume the company's growth rate slows to the industry average in five years. What future return on equity does this imply?
6. Carrington and Genevieve are not sure if they should sell the company. If they do not sell the company outright to East Coast Yachts, they would like to try and increase the value of the company's stock. In this case, they want to retain control of the company and do not want to sell stock to outside investors. They also feel that the company's debt is at a manageable level and do not want to borrow more money. What steps can they take to try and increase the price of the stock? Are there any conditions under which this strategy would *not* increase the stock price?