CHAPTER 6

Common Stock Valuation

A fundamental assertion of finance holds that a security's value is based on the present value of its future cash flows. Accordingly, common stock valuation attempts the difficult task of predicting the future. Consider that the average dividend yield for large-company stocks is about 2 percent. This implies that the present value of dividends to be paid over the next 10 years constitutes only a fraction of the stock price. Thus, most of the value of a typical stock is derived from dividends to be paid more than 10 years away!

As a stock market investor, not only must you decide which stocks to buy and which stocks to sell, but you must also decide when to buy them and when to sell them. In the words of a well-known Kenny Rogers song, "You gotta know when to hold 'em, and know when to fold 'em." This task requires a careful appraisal of intrinsic economic value. In this chapter, we examine several methods commonly used by financial analysts to assess the economic value of common stocks. These methods are grouped into two categories: dividend discount models and price ratio models. After studying these models, we provide an analysis of a real company to illustrate the use of the methods discussed in this chapter.

6.1 Security Analysis: Be Careful Out There

It may seem odd that we start our discussion with an admonition to be careful, but, in this case, we think it is a good idea. The methods we discuss in this chapter are examples of those used by many investors and security analysts to assist in making buy and sell decisions for individual stocks. The basic idea is to identify both "undervalued" or "cheap" stocks to buy and "overvalued" or "rich" stocks to sell. In practice, however, many stocks that look cheap may in fact be correctly priced for reasons not immediately apparent to the analyst. Indeed, the hallmark of a good analyst is a cautious attitude and a willingness to probe further and deeper before committing to a final investment recommendation.

The type of security analysis we describe in this chapter falls under the heading of **fundamental analysis**. Numbers such as a company's earnings per share, cash flow, book equity value, and sales are often called fundamentals because they describe, on a basic level, a specific firm's operations and profits (or lack of profits).

> (*marg. def.* **fundamental analysis** Examination of a firm's accounting statements and other financial and economic information to assess the economic value of a company's stock.)

Fundamental analysis represents the examination of these and other accounting statement-based company data used to assess the value of a company's stock. Information, regarding such things as management quality, products, and product markets is often examined as well.

Our cautionary note is based on the skepticism these techniques should engender, at least when applied simplistically. As our later chapter on market efficiency explains, there is good reason to believe that too-simple techniques that rely on widely available information are not likely to yield systematically superior investment results. In fact, they could lead to unnecessarily risky investment

decisions. This is especially true for ordinary investors (like most of us) who do not have timely access to the information that a professional security analyst working for a major securities firm would possess.

As a result, our goal here is not to teach you how to “pick” stocks with a promise that you will become rich. Certainly, one chapter in an investments text is not likely to be sufficient to acquire that level of investment savvy. Instead, an appreciation of the techniques in this chapter is important simply because buy and sell recommendations made by securities firms are frequently couched in the terms we introduce here. Much of the discussion of individual companies in the financial press relies on these concepts as well, so some background is necessary just to interpret much commonly presented investment information. In essence, you must learn both the lingo and the concepts of security analysis.

CHECK THIS

6.1a What is fundamental analysis?

6.1b What is a “rich” stock? What is a “cheap” stock?

6.2 The Dividend Discount Model

A fundamental principle of finance holds that the economic value of a security is properly measured by the sum of its future cash flows, where the cash flows are adjusted for risk and the time value of money. For example, suppose a risky security will pay either $100 or $200 with equal probability one year from today. The expected future payoff is $150 = ($100 + $200) / 2, and the security's value today is the $150 expected future value discounted for a one-year waiting period.

If the appropriate discount rate for this security is, say, 5 percent, then the present value of the expected future cash flow is \$150 / 1.05 = \$142.86. If instead the appropriate discount rate is 15 percent, then the present value is \$150 / 1.15 = \$130.43. As this example illustrates, the choice of a discount rate can have a substantial impact on an assessment of security value.

A popular model used to value common stock is the **dividend discount model**, or **DDM**. The dividend discount model values a share of stock as the sum of all expected future dividend payments, where the dividends are adjusted for risk and the time value of money.

> (*marg. def.* **dividend discount model (DDM)** Method of estimating the value of a share of stock as the present value of all expected future dividend payments.)

For example, suppose a company pays a dividend at the end of each year. Let $D(t)$ denote a dividend to be paid t years from now, and let $V(0)$ represent the present value of the future dividend stream. Also, let k denote the appropriate risk-adjusted discount rate. Using the dividend discount model, the present value of a share of this company's stock is measured as this sum of discounted future dividends:

$$V(0) = \frac{D(1)}{(1+k)} + \frac{D(2)}{(1+k)^2} + \frac{D(3)}{(1+k)^3} + \ldots + \frac{D(T)}{(1+k)^T} \qquad [1]$$

This expression for present value assumes that the last dividend is paid T years from now, where the value of T depends on the specific valuation problem considered. Thus if, T = 3 years and $D(1) = D(2) = D(3) = \$100$, the present value $V(0)$ is stated as

$$V(0) = \frac{\$100}{(1+k)} + \frac{\$100}{(1+k)^2} + \frac{\$100}{(1+k)^3}$$

If the discount rate is k = 10 percent, then a quick calculation yields $V(0)$ = \$248.69, so the stock price should be about \$250 per share.

Example 6.1 Using the DDM. Suppose again that a stock pays three annual dividends of \$100 per year and the discount rate is k = 15 percent. In this case, what is the present value $V(0)$ of the stock?

With a 15 percent discount rate, we have

$$V(0) = \frac{\$100}{(1.15)} + \frac{\$100}{(1.15)^2} + \frac{\$100}{(1.15)^3}$$

Check that the answer is $V(0)$ = \$228.32.

Example 6.2 More DDM. Suppose instead that the stock pays three annual dividends of \$10, \$20, and \$30 in years 1, 2, and 3, respectively, and the discount rate is k = 10 percent. What is the present value $V(0)$ of the stock?

In this case, we have

$$V(0) = \frac{\$10}{(1.10)} + \frac{\$20}{(1.10)^2} + \frac{\$30}{(1.10)^3}$$

Check that the answer is $V(0)$ = \$48.16.

Constant Dividend Growth Rate Model

For many applications, the dividend discount model is simplified substantially by assuming that dividends will grow at a constant growth rate. This is called a constant growth rate model. Letting a constant growth rate be denoted by g, then successive annual dividends are stated as $D(t+1) = D(t)(1+g)$.

> (*marg. def.* **constant growth rate model** A version of the dividend discount model that assumes a constant dividend growth rate.

For example, suppose the next dividend is $D(1)$ = \$100, and the dividend growth rate is g = 10 percent. This growth rate yields a second annual dividend of $D(2)$ = \$100 × 1.10 = \$110, and

a third annual dividend of $D(3) = \$100 \times 1.10 \times 1.10 = \$100 \times (1.10)^2 = \$121$. If the discount rate is $k = 12$ percent, the present value of these three sequential dividend payments is the sum of their separate present values:

$$V(0) = \frac{\$100}{(1.12)} + \frac{\$110}{(1.12)^2} + \frac{\$121}{(1.12)^3}$$
$$= \$263.10$$

If the number of dividends to be paid is large, calculating the present value of each dividend separately is tedious and possibly prone to error. Fortunately, if the growth rate is constant, some simplified expressions are available to handle certain special cases. For example, suppose a stock will pay annual dividends over the next T years, and these dividends will grow at a constant growth rate g, and be discounted at the rate k. The current dividend is $D(0)$, the next dividend is $D(1) = D(0)(1+g)$, the following dividend is $D(2) = D(1)(1+g)$, and so forth. The present value of the next T dividends, that is, $D(1)$ through $D(T)$, can be calculated using this relatively simple formula:

$$V(0) = \frac{D(0)(1+g)}{k-g}\left(1 - \left(\frac{1+g}{1+k}\right)^T\right) \qquad g \neq k \qquad [2]$$

Notice that this expression requires that the growth rate and the discount rate not be equal to each other, that is, $k \neq g$, since this requires division by zero. Actually, when the growth rate is equal to the discount rate, that is, $k = g$, the effects of growth and discounting cancel exactly, and the present value $V(0)$ is simply the number of payments T times the current dividend $D(0)$:

$$V(0) = T \times D(0) \qquad g = k$$

As a numerical illustration of the constant growth rate model, suppose that the growth rate is g = 8 percent, the discount rate is k = 10 percent, the number of future annual dividends is T = 20 years, and the current dividend is $D(0)$ = \$10. In this case, a present value calculation yields this amount:

$$V(0) = \frac{\$10(1.08)}{.10 - .08}\left(1 - \left(\frac{1.08}{1.10}\right)^{20}\right)$$
$$= \$165.88$$

Example 6.3 Using the Constant Growth Model. Suppose that the dividend growth rate is 10 percent, the discount rate is 8 percent, there are 20 years of dividends to be paid, and the current dividend is \$10. What is the value of the stock based on the constant growth model?

Plugging in the relevant numbers, we have

$$V(0) = \frac{\$10(1.10)}{.08 - .10}\left(1 - \left(\frac{1.10}{1.08}\right)^{20}\right)$$
$$= \$243.86$$

Thus, the price should be $V(0)$ = \$243.86.

Constant Perpetual Growth

A particularly simple form of the dividend discount model occurs in the case where a firm will pay dividends that grow at the constant rate g forever. This case is called the **constant perpetual growth model**. In the constant perpetual growth model, present values are calculated using this relatively simple formula:

$$V(0) = \frac{D(0)(1+g)}{k-g} \qquad g < k \qquad [3]$$

Since $D(0)(1 + g) = D(1)$, we could also write the constant perpetual growth model as

$$V(0) = \frac{D(1)}{k - g} \qquad g < k \qquad [4]$$

Either way, we have a very simple, and very widely used, expression for the value of a share of stock based on future dividend payments.

> (*marg. def.* **constant perpetual growth model** A version of the dividend discount model in which dividends grow forever at a constant rate, and the growth rate is strictly less than the discount rate.

Notice that the constant perpetual growth model requires that the growth rate be strictly less than the discount rate, that is, $g < k$. It looks like the share value would be negative if this were not true. Actually, the formula is simply not valid in this case. The reason is that a perpetual dividend growth rate greater than a discount rate implies an *infinite* value because the present value of the dividends keeps getting bigger and bigger. Since no security can have infinite value, the requirement that $g < k$ simply makes good economic sense.

To illustrate the constant perpetual growth model, suppose that the growth rate is $g = 4$ percent, the discount rate is $k = 9$ percent, and the current dividend is $D(0) = \$10$. In this case, a simple calculation yields

$$V(0) = \frac{\$10(1.04)}{.09 - .04} = \$208$$

Example 6.4 Using the constant perpetual growth model Suppose dividends for a particular company are projected to grow at 5 percent forever. If the discount rate is 15 percent and the current dividend is $10, what is the value of the stock?

$$V(0) = \frac{\$10(1.05)}{.15 - .05} = \$105$$

As shown, the stock should sell for $105.

Applications of the Constant Perpetual Growth Model

In practice, the simplicity of the constant perpetual growth model makes it the most popular dividend discount model. Certainly, the model satisfies Einstein's famous dictum: “Simplify as much as possible, but no more.” However, experienced financial analysts are keenly aware that the constant perpetual growth model can be usefully applied only to companies with a history of relatively stable earnings and dividend growth expected to continue into the distant future.

A standard example of an industry for which the constant perpetual growth model can often be usefully applied is the electric utility industry. Consider the first company in the Dow Jones Utilities, American Electric Power, which is traded on the New York Stock Exchange under the ticker symbol AEP. At midyear 1997, AEP's annual dividend was $2.40; thus we set $D(0) = \$2.40$.

To use the constant perpetual growth model, we also need a discount rate and a growth rate. An old quick and dirty rule of thumb for a risk-adjusted discount rate for electric utility companies is the yield to maturity on 20-year maturity U.S. Treasury bonds, plus 2 percent. At the time this example was written, the yield on 20-year maturity T-bonds was about 6.75 percent. Adding 2 percent, we get a discount rate of $k = 8.75$ percent.

At mid-year 1997, AEP had not increased its dividend for several years. However, a future growth rate of 0.0 percent for AEP might be unduly pessimistic, since income and cash flow grew

at a rate of 3.4 percent over the prior five years Furthermore, the median dividend growth rate for the electric utility industry was 1.8 percent. Thus, a rate of, say, 2 percent might be more realistic as an estimate of future growth.

Putting it all together, we have $k = 8.75$ percent, $g = 2.0$ percent, and $D(0) = \$2.40$. Using these numbers, we obtain this estimate for the value of a share of AEP stock:

$$V(0) = \frac{\$2.40(1.02)}{.0875 - .02} = \$36.27$$

This estimate is less than the mid-year 1997 AEP stock price of $43, possibly suggesting that AEP stock was overvalued.

We emphasize the word "possibly" here because we made several assumptions in the process of coming up with this estimate. A change in any of these assumptions could easily lead us to a different conclusion. We will return to this point several times in future discussions.

Example 6.5 Valuing Detroit Ed In 1997, the utility company Detroit Edison (ticker DTE) paid a $2.08 dividend. Using $D(0) = \$2.08$, $k = 8.75$ percent, and $g = 2.0$ percent, calculate a present value estimate for DTE. Compare this with the 1997 DTE stock price of $29.

Plugging in the relevant numbers, we immediately have that:

$$V(0) = \frac{\$2.08(1.02)}{.0875 - .02} = \$31.43$$

We see that our estimated price is a little higher than the $29 stock price.

Sustainable Growth Rate

In using the constant perpetual growth model, it is necessary to come up with an estimate of g, the growth rate in dividends. In our previous examples, we touched on two ways to do this: (1) using the company's historical average growth rate, or 2) using an industry median or average

growth rate. We now describe using a third way, known as the **sustainable growth rate**, which involves using a company's earnings to estimate *g*.

(*marg. def*. **sustainable growth rate** A dividend growth rate that can be sustained by a company's earnings.)

As we have discussed, a limitation of the constant perpetual growth model is that it should be applied only to companies with stable dividend and earnings growth. Essentially, a company's earnings can be paid out as dividends to its stockholders or kept as **retained earnings** within the firm to finance future growth. The proportion of earnings paid to stockholders as dividends is called the **payout ratio**. The proportion of earnings retained for reinvestment is called the **retention ratio**.

(*marg. def.* **retained earnings** Earnings retained within the firm to finance growth.)

(*marg. def*. **payout ratio** Proportion of earnings paid out as dividends.)

(*marg. def.* **retention ratio** Proportion of earnings retained for reinvestment.)

If we let *D* stand for dividends and *EPS* stand for earnings per share, then the payout ratio is simply *D/EPS*. Since anything not paid out is retained, the retention ratio is just one minus the payout ratio. For example, if a company's current dividend is $4 per share, and its earnings per share are currently $10, then the payout ratio is $4 / $10 = .40, or 40 percent, and the retention ratio is 1 - 0.40 = .60, or 60 percent.

A firm's sustainable growth rate is equal to its return on equity (ROE) times its retention ratio:[1]

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[1]Strictly speaking, this formula is correct only if ROE is calculated using beginning-of-period stockholder's equity. If ending figures are used, then the precise formula is ROE × Retention Ratio / (1 - ROE × Retention Ratio). However, the error from not using the precise formula is usually small, so most analysts do not bother with it.

Sustainable growth rate = ROE × Retention ratio [5]

= ROE × (1 - Payout ratio)

Return on equity is commonly computed using an accounting-based performance measure and is calculated as a firm's net income divided by stockholders' equity:

Return on equity (ROE) = Net income / Equity [6]

Example 6.6 Calculating Sustainable Growth At mid-year 1997, American Electric Power (AEP) had a return on equity of ROE = 12.5 percent, earnings per share of EPS = $3.09, and a per share dividend of D(0) = $2.40. What was AEP's retention ratio? Its sustainable growth rate?

AEP's dividend payout was $2.40 / $3.09 = .777, or 77.7 percent. Its retention ratio was thus 1 - 0.777 = .223, or 22.3 percent. Finally, the AEP's sustainable growth rate was .223 × 12.5 percent = 2.79%.

Example 6.7 Valuing American Electric Power (AEP). Using AEP's sustainable growth rate of 2.79 percent (see Example 6.6) as an estimate of perpetual dividend growth and its current dividend of $2.40, what is the value of AEP's stock assuming a discount rate of 8.75 percent?

If we plug the various numbers into the perpetual growth model, we obtain a value of $41.39 = $2.40(1.0279) / (0.0875 - 0.0279). This is fairly close to AEP's mid-year 1997 stock price of $43, suggesting that AEP stock was probably correctly valued, at least on the basis of a 2.79 percent sustainable growth rate for future dividends.

Example 6.8 Valuing Detroit Edison (DTE) In 1997, DTE had a return on equity of ROE = 7.9 percent, earnings per share of EPS = $1.87, and a per share dividend of D(0) = $2.08. Assuming an 8.75 percent discount rate, what is the value of DTE's stock?

DTE's payout ratio was $2.08 / $1.87 = 1.112. Thus, DTE's retention ratio was 1 - 1.112 = -.112, or -11.2 percent. DTE's sustainable growth rate was -.112 × 7.9% = -.00885, or -.885%. Finally, using the constant growth model, we obtain a value of $2.08(.99115) / (.0875 - (- .00885)) = $21.47. This is much less than DTE's 1997 stock price of $29, suggesting that DTE's stock is perhaps overvalued, or, more likely, that a -.885 percent growth rate underestimates DTE's future dividend growth.

As illustrated by Example 6.8, a common problem with sustainable growth rates is that they are sensitive to year-to-year fluctuations in earnings. As a result, security analysts routinely adjust sustainable growth rate estimates to smooth out the effects of earnings variations. Unfortunately,

there is no universally standard method to adjust a sustainable growth rate, and analysts depend a great deal on personal experience and their own subjective judgment.

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6.2a Compare the dividend discount model, the constant growth model, and the constant perpetual growth model. How are they alike? How do they differ?

6.2b What is a sustainable growth rate? How is it calculated?

6.3 Two-stage Dividend Growth Model

In the previous section, we examined dividend discount models based on a single growth rate. You may have already thought that a single growth rate is often unrealistic, since companies often experience temporary periods of unusually high or low growth, with growth eventually converging to an industry average or an economy-wide average. In such cases as these, financial analysts frequently use a **two-stage dividend growth model**.

> (*marg. def.* **two-stage dividend growth model** Dividend model that assumes a firm will temporarily grow at a rate different from its long-term growth rate.)

A two-stage dividend growth model assumes that a firm will initially grow at a rate g_1 during a first stage of growth lasting T years, and thereafter grow at a rate g_2 during a perpetual second stage of growth. The present value formula for the two-stage dividend growth model is stated as follows:

$$V(0) = \frac{D(0)(1+g_1)}{k-g_1}\left(1 - \left(\frac{1+g_1}{1+k}\right)^T\right) + \left(\frac{1+g_1}{1+k}\right)^T \frac{D(0)(1+g_2)}{k-g_2} \quad k>g_2 \qquad [7]$$

At first glance, this expression looks a little complicated. However, it simplifies if we look at its two distinct parts individually. The first term on the right-hand side measures the present value of the first *T* dividends and is the same expression we used earlier for the constant growth model. The second term then measures the present value of all subsequent dividends.

Using the formula is mostly a matter of "plug and chug" with a calculator. For example, suppose a firm has a current dividend of \$2, and dividends are expected to grow at the rate $g_1 = 20$ percent for T = 5 years, and thereafter grow at the rate $g_2 = 5$ percent. With a discount rate of k = 12 percent, the present value V(0) is calculated as

$$\begin{aligned} V(0) &= \frac{\$2(1.20)}{.12-.20}\left(1-\left(\frac{1.20}{1.12}\right)^5\right)+\left(\frac{1.20}{1.12}\right)^5\frac{\$2(1.05)}{.12-.05} \\ &= \$12.36+\$42.36 \\ &= \$54.72 \end{aligned}$$

In this calculation, the total present value of \$54.72 is the sum of a \$12.36 present value for the first five dividends, plus a \$42.36 present value for all subsequent dividends.

Example 6.9 Using the Two-Stage Model Suppose a firm has a current dividend of D(0) = \$5, which is expected to "shrink" at the rate $g_1 = -10$ percent for T = 5 years, and thereafter grow at the rate $g_2 = 4$ percent. With a discount rate of k = 10 percent, what is the value of the stock?

Using the two-stage model, present value, V(0), is calculated as

$$\begin{aligned} V(0) &= \frac{\$5(0.90)}{.10-(-.10)}\left(1-\left(\frac{0.90}{1.10}\right)^5\right)+\left(\frac{0.90}{1.10}\right)^5\frac{\$5(1.04)}{.10-.04} \\ &= \$14.25+\$31.78 \\ &= \$46.03 \end{aligned}$$

The total present value of \$46.03 is the sum of a \$14.25 present value of the first five dividends plus a \$31.78 present value of all subsequent dividends.

The two-stage growth formula requires that the second-stage growth rate be strictly less than the discount rate, that is, $g_2 < k$. However, the first-stage growth rate g_1 can be greater, smaller, or equal to the discount rate. In the special case where the first-stage growth rate is equal to the discount rate, that is, $g_1 = k$, the two-stage formula reduces to this form:

$$V(0) = D(0) \times T + \frac{D(0)(1+g_2)}{k - g_2}$$

You may notice with satisfaction that this two-stage formula is much simpler than the general two-stage formula. However, a first-stage growth rate is rarely exactly equal to a risk-adjusted discount rate, so this simplified formula sees little use.

Example 6.10 Valuing American Express American Express is a stock in the Dow Jones Industrial Average that trades on the New York Stock Exchange under the ticker symbol AXP. At midyear 1997, AXP's previous 5-year growth rate was 19.6 percent and analysts were forecasting a 13.2 percent long-term growth rate. Suppose AXP grows at a 19.6 percent rate for another 5 years, and thereafter grows at a 13.2 percent rate. What value would we place on AXP by assuming a 14.5 percent discount rate? AXP's 1997 dividend was $0.92.

Plugging in all the relevant numbers into a two-stage present value calculation yields:

$$\begin{aligned} V(0) &= \frac{\$0.92(1.196)}{.145 - .196}\left(1 - \left(\frac{1.196}{1.145}\right)^5\right) + \left(\frac{1.196}{1.145}\right)^5 \frac{\$0.92(1.132)}{.145 - .132} \\ &= \$5.25 + \$99.61 \\ &= \$104.86 \end{aligned}$$

This present value estimate is somewhat higher than American Express's $80 midyear 1997 stock price, suggesting that AXP might be undervalued or that these growth rate estimates are overly optimistic.

Example 6.11 Have a Pepsi? PepsiCo, Inc. stock trades on the New York Stock Exchange under the ticker symbol PEP. At midyear 1997, analysts forecasted a long-term 12.0 percent growth rate for PepsiCo, although its recent 5-year growth was only 1.2 percent. Suppose PEP grows at a 1.2 percent rate for 5 years, and thereafter grows at a 12.0 percent rate. Assuming a 16.0 percent discount rate, what value would you place on PEP? The 1997 dividend was $.47.

Once again, we round up all the relevant numbers and plug them in to get

$$V(0) = \frac{\$0.47(1.012)}{.16-.012}\left(1-\left(\frac{1.012}{1.16}\right)^5\right) + \left(\frac{1.012}{1.16}\right)^5 \frac{\$0.47(1.12)}{.16-.12}$$

$$= \$1.59 + \$6.65$$

$$= \$8.24$$

This present value is grossly lower than PepsiCo's 1997 stock price of $37.50, suggesting that something is probably wrong with our analysis. Since the discount rate is greater than the first-stage growth rate used above, we should try to use the constant perpetual growth model. The constant perpetual growth formula yields this present value calculation:

$$V(0) = \frac{\$0.47(1.12)}{.16-.12}$$

$$= \$13.16$$

This is still far below PepsiCo's actual $37.50 stock price. The lesson of this example is that the dividend discount model does not always work well. Analysts know this - so should you!

As a practical matter, most stocks with a first-stage growth rate greater than a discount rate do not pay dividends and therefore cannot be evaluated using a dividend discount model. Nevertheless, as our next example shows, there are some high-growth companies that pay regular dividends.

Example 6.12 Stride-Rite Corp. Stride-Rite trades under the ticker symbol SRR. At mid-year 1997, analysts forecasted a 30 percent growth rate for Stride-Rite. Suppose SRR grows at this rate for 5 years, and thereafter grows at a sector average 9.4 percent rate. Assuming a 13.9 percent discount rate, and beginning with SRR's 1997 dividend of $.20, what is your estimate of SRR’s value?

A two-stage present value calculation yields

$$V(0) = \frac{\$0.20(1.30)}{.139 - .30}\left(1 - \left(\frac{1.30}{1.139}\right)^5\right) + \left(\frac{1.30}{1.139}\right)^5 \frac{\$0.20(1.094)}{.139 - .094}$$

$$= \$1.51 + \$9.42$$

$$= \$10.93$$

This present value estimate is lower than Stride-Rite's 1997 stock price of $13.06, suggesting that SRR might be overvalued.

Discount Rates for Dividend Discount Models

You may wonder where the discount rates used in the preceding examples come from. The answer is that they come from the capital asset pricing model (CAPM). Although a detailed discussion of the CAPM is deferred to a later chapter, we can here point out that, based on the CAPM, the discount rate for a stock can be estimated using this formula:

Discount rate = U.S. T-bill rate

+ Stock beta × Stock market risk premium [8]

The components of this formula, as we use it here, are defined as:

U.S. T-bill rate: **return on 90-day U.S. T-bills**

Stock beta: **risk relative to an average stock**

Stock market risk premium: **risk premium for an average stock**

The basic intuition for this approach can be traced back to Chapter 1. There we saw that the return we expect to earn on a risky asset had two parts, a "wait" component and a "worry" component. We labeled the wait component as the *time value of money*, and we noted that it can be

measured as the return we earn from an essentially riskless investment. Here we use the return on a 90-day Treasury bill as the riskless return.

We called the worry component the *risk premium*, and we noted that the greater the risk, the greater the risk premium. Depending on the exact period studied, the risk premium for the market as a whole over the past 70 or so years has averaged about 8.6 percent. This 8.6 percent can be interpreted as the risk premium for bearing an average amount of stock market risk, and we use it as the stock market risk premium.

Finally, when we look at a particular stock, we recognize that it may be more or less risky than an average stock. A stock's **beta** is a measure of a single stock's risk relative to an average stock, and we discuss beta at length in a later chapter. For now, it suffices to know that the market average beta is 1.0. A beta of 1.5 indicates that a stock has 50 percent more risk than average, so its risk premium is 50 percent higher. A beta of .50 indicates that a stock is 50 percent less sensitive than average to market volatility, and has a smaller risk premium

(*marg. def.* **beta** Measure of a stock's risk relative to the stock market average.)

When this chapter was written, the T-bill rate was 5 percent. Taking it as given for now, the stock beta for PepsiCo of 1.28 yields an estimated discount rate of 5% + (1.28 × 8.6%) = 16.0%. Similarly, the stock beta for American Express of 1.11 yields the discount rate 5% + (1.11 × 8.6%) = 14.5%. For the remainder of this chapter, we use discount rates calculated according to this CAPM formula.

Example 6.13 Stride-Rite's Beta Look back at Example 6.12. What beta did we use to determine the appropriate discount rate for Stride-Rite? How do you interpret this beta?

Again assuming a T-bill rate of 5 percent and stock market risk premium of 8.6 percent, we have

$$13.9\% = 5\% + \text{Stock beta} \times 8.6\%$$

thus

$$\text{Stock beta} = (13.9\% - 5\%) / 8.6\% = 1.035$$

Since Stride-Rite's beta is greater than 1.0, it had greater risk than an average stock — specifically, 3.5 percent more.

Observations on Dividend Discount Models

We have examined two dividend discount models: the constant perpetual growth model and the two-stage dividend growth model. Each model has advantages and disadvantages. Certainly, the main advantage of the constant perpetual growth model is that it is simple to compute. However, it has several disadvantages: (1) it is not usable for firms not paying dividends, (2) it is not usable when a growth rate is greater than a discount rate, (3) it is sensitive to the choice of growth rate and discount rate, (4) discount rates and growth rates may be difficult to estimate accurately, and (5) constant perpetual growth is often an unrealistic assumption.

The two-stage dividend growth model offers several improvements: (1) it is more realistic, since it accounts for low, high, or zero growth in the first stage, followed by constant long-term growth in the second stage, and (2) the two-stage model is usable when a first-stage growth rate is greater than a discount rate. However, the two-stage model is also sensitive to the choice of discount rate and growth rates, and it is not useful for companies that don't pay dividends.

Financial analysts readily acknowledge the limitations of dividend discount models. Consequently, they also turn to other valuation methods to expand their analyses. In the next section, we discuss some popular stock valuation methods based on price ratios.

CHECK THIS

6.3a What are the three parts of a CAPM-determined discount rate?

6.3b Under what circumstances is a two-stage dividend discount model appropriate?

6.4 Price Ratio Analysis

Price ratios are widely used by financial analysts; more so even than dividend discount models. Of course, all valuation methods try to accomplish the same thing, which is to appraise the economic value of a company's stock. However, analysts readily agree that no single method can adequately handle this task on all occasions. In this section, we therefore examine several of the most popular price ratio methods and provide examples of their use in financial analysis.

Price - Earnings Ratios

The most popular price ratio used to assess the value of common stock is a company's **price-earnings ratio**, abbreviated as **P/E ratio**. In fact, as we saw in Chapter 3, P/E ratios are reported in the financial press every day. As we discussed, a price-earnings ratio is calculated as the ratio of a firm's current stock price divided by its annual earnings per share (EPS).

(*marg. def.* **price-earnings (P/E) ratio** Current stock price divided by annual earnings per share (EPS).)

The inverse of a P/E ratio is called an **earnings yield**, and it is measured as earnings per share divided by a current stock price (E/P). Clearly, an earnings yield and a price-earnings ratio are simply two ways to measure the same thing. In practice, earnings yields are less commonly stated and used than P/E ratios.

(*marg. def.* **earnings yield** Inverse of the P/E ratio: earnings divided by price (E/P))

Since most companies report earnings each quarter, annual earnings per share can be calculated either as the most recent quarterly earnings per share times four or the sum of the last four quarterly earnings per share figures. Most analysts prefer the first method of multiplying the latest quarterly earnings per share value times four. However, some published data sources, including the *Wall Street Journal*, report annual earnings per share as the sum of the last four quarters' figures. The difference is usually small, but it can sometimes be a source of confusion.

Financial analysts often refer to high-P/E stocks as **growth stocks**. To see why, notice that a P/E ratio is measured as a *current* stock price over *current* earnings per share. Now, consider two companies with the same current earnings per share, where one company is a high-growth company and the other is a low-growth company. Which company do you think should have a higher stock price, the high-growth company or the low-growth company?

(*marg. def.* **growth stocks** A term often used to describe high-P/E stocks.)

This question is a no-brainer. All else equal, we would be surprised if the high-growth company did not have a higher stock price, and therefore a higher P/E ratio. In general, companies with higher expected earnings growth will have higher P/E ratios, which is why high-P/E stocks are often referred to as growth stocks.

To give an example, Starbucks Corporation is a specialty coffee retailer with a history of aggressive sales growth. Its stock trades on the Nasdaq under the ticker symbol SBUX. At midyear 1997, SBUX stock traded at $38 per share with earnings per share of EPS = $.48, and therefore had a P/E ratio of $38 / $0.48 = 79.2. By contrast, the median P/E ratio for retail food stores was 24.4. SBUX paid no dividends and reinvested all earnings. Because of its strong growth and high P/E ratio, SBUX would be regarded as a growth stock.

The reasons high-P/E stocks are called growth stocks seems obvious enough; however, in a seeming defiance of logic, low-P/E stocks are often referred to as **value stocks**. The reason is that low-P/E stocks are often viewed as "cheap" relative to *current* earnings. (Notice again the emphasis on "current.") This suggests that these stocks may represent good investment values, and hence the term value stocks.

(*marg. def.* **value stocks** A term often used to describe low-P/E stocks.)

For example, at midyear 1997, Chrysler Corporation stock traded for $37 per share with earnings per share of EPS = $4.30. Its P/E ratio of 8.6 was far below the median automotive industry P/E ratio of 16.4. Because of its low P/E ratio, Chrysler might be regarded as a value stock.

Having said all this, we want to emphasize that the terms "growth stock" and "value stock" are mostly just commonly-used labels. Of course, only time will tell whether a high-P/E stock turns out to actually be a high-growth stock, or whether a low-P/E stock is really a good value.

Price - Cash Flow Ratios

Instead of price-earnings (P/E) ratios, many analysts prefer to look at price-cash flow (P/CF) ratios. A **price/cash flow ratio** is measured as a company's current stock price divided by its current

annual cash flow per share. Like earnings, cash flow is normally reported quarterly and most analysts multiply the last quarterly cash flow figure by four to obtain annual cash flow. Again, like earnings, many published data sources report annual cash flow as a sum of the latest four quarterly cash flows.

(*marg. def.* **price-cash flow (P/CF) ratio** Current stock price divided by current cash flow per share.)

There are a variety of definitions of **cash flow**. In this context, the most common measure is simply calculated as net income plus depreciation, so this is the one we use here. In the next chapter, we examine in detail how cash flow is calculated in a firm's financial statements. Cash flow is usually reported in a firm's financial statements and labeled as cash flow from operations (or operating cash flow).

(*marg. def.* **cash flow** In the context of the price-cash flow ratio, usually taken to be net income plus depreciation.)

The difference between earnings and cash flow is often confusing, largely because of the way that standard accounting practice defines net income. Essentially, net income is measured as revenues minus expenses. Obviously, this is logical. However, not all expenses are actually cash expenses. The most important exception is depreciation.

When a firm acquires a long-lived asset such as a new factory facility, standard accounting practice does not deduct the cost of the factory all at once, even though it is actually paid for all at once. Instead, the cost is deducted over time. These deductions do not represent actual cash payments, however. The actual cash payment occurred when the factory was purchased. At this point you may be a little confused about why the difference is important, but hang in there for a few more paragraphs.

Most analysts agree that cash flow can be more informative than net income in examining a company's financial performance. To see why, consider the hypothetical example of two identical companies: Twiddle-Dee Co. and Twiddle-Dum Co. Suppose that both companies have the same constant revenues and expenses in each year over a three-year period. These constant revenues and cash expenses (excluding depreciation) yield the same constant annual cash flows, and they are stated as follows:

	Twiddle-Dee	*Twiddle-Dum*
Revenues	$5,000	$5,000
Cash expenses	-3,000	-3,000
Cash flow	$2,000	$2,000

Thus, both companies have the same $2,000 cash flow in each of the three years of this hypothetical example.

Next, suppose that both companies incur total depreciation of $3,000 spread out over the three-year period. Standard accounting practice sometimes allows a manager to choose among several depreciation schedules. Twiddle-Dee Co. chooses straight-line depreciation and Twiddle-Dum Co. chooses accelerated depreciation. These two depreciation schedules are tabulated below:

	Twiddle-Dee	*Twiddle-Dum*
Year 1	$1,000	$1,500
Year 2	1,000	1,000
Year 3	1,000	500
Total	$3,000	$3,000

Note that total depreciation over the three-year period is the same for both companies. However, Twiddle-Dee Co. has the same $1,000 depreciation in each year, while Twiddle-Dum Co. has accelerated depreciation of $1,500 in the first year, $1,000 in the second year, and $500 depreciation in the third year.

Now, let's look at the resulting annual cash flows and net income figures for the two companies, recalling that in each year, Cash flow = Net income + Depreciation:

	Twiddle-Dee		*Twiddle-Dum*	
	Cash Flow	Net Income	Cash Flow	Net Income
Year 1	$2,000	$1,000	$2,000	$500
Year 2	2,000	1,000	2,000	1,000
Year 3	2,000	1,000	2,000	1,500
Total	$6,000	$3,000	$6,000	$3,000

Note that Twiddle-Dum Co.'s net income is lower in the first year and higher in the third year than Twiddle-Dee Co.'s net income. This is purely a result of Twiddle-Dum Co.'s accelerated depreciation schedule, and has nothing to do with Twiddle-Dum Co.'s actual profitability. However, an inexperienced analyst observing Twiddle-Dum Co.'s rapidly rising annual earnings figures might incorrectly label Twiddle-Dum as a growth company. An experienced analyst would observe that there was no cash flow growth to support this naive conclusion.

Financial analysts typically use both price-earnings ratios and price-cash flow ratios. They point out that when a company's earnings per share is not significantly larger than its cash flow per share, this is a signal, at least potentially, of good-quality earnings. The term “quality” means that the

accounting earnings mostly reflect actual cash flow, not just accounting numbers. When earnings and cash flow are far from each other, this may be a signal of poor quality earnings.

Going back to some earlier examples, at midyear 1997, Starbucks Corporation had cash flow per share of CFPS = $1.19, yielding a P/CF ratio of 31.9. Notice that SBUX cash flow per share was over twice its earnings per share of $.48, suggesting good quality earnings. At midyear 1997, Chrysler Corporation had a cash flow per share of CFPS = $8, yielding a P/CF ratio of 4.6. This was somewhat lower than Chrysler's P/E ratio of 8.6, suggesting that Chrysler had good quality earnings.

Price - Sales Ratios

An alternative view of a company's performance is provided by its **price-sales (P/S) ratio**. A price-sales ratio is calculated as the current price of a company's stock divided by its current annual sales revenue per share. A price-sales ratio focuses on a company's ability to generate sales growth. Essentially, a high P/S ratio would suggest high sales growth, while a low P/S ratio might indicate sluggish sales growth.

(*marg. def.* **price/sales (P/S) ratio** Current stock price divided by annual sales per share.)

For example, at midyear 1997, Starbucks Corporation had a price-sales ratio of 3.7, compared to the median food store P/S ratio of .7. This is consistent with our other price ratios indicating that Starbucks is a growth company. Of course, only time will tell how much growth Starbucks will actually realize. In contrast, at midyear 1997, Chrysler Corporation had a price-sales ratio of .4, which was the same as the automotive industry median P/S ratio of .4. This indicates that Chrysler's sales revenue might only be expected to grow at the industry average rate.

Price - Book Ratios

A very basic price ratio for a company is its **price-book (P/B) ratio**, sometimes called the market-book ratio. A price-book ratio is measured as the market value of a company's outstanding common stock divided by its book value of equity.

> (*marg. def.* **price-book (P/B) ratio** Market value of a company's common stock divided by its book (or accounting) value of equity.)

Price-book ratios are appealing because book values represent, in principle, historical cost. The stock price is an indicator of current value, so a price-book ratio simply measures what the equity is worth today relative to what it cost. A ratio bigger than 1.0 indicates that the firm has been successful in creating value for its stockholders. A ratio smaller than 1.0 indicates that the company is actually worth less than it cost.

This interpretation of price-book ratio seems simple enough, but the truth is that because of varied and changing accounting standards, book values are difficult to interpret. For this and other reasons, price-book ratios may not have as much information value as they once did. The nearby Investment Updates box contains an article reprinted from the *Wall Street Journal* discussing well-known problems associated with the use of book values in financial analysis.

Investment Updates: Book Value

Applications of Price Ratio Analysis

Price-earnings ratios, price-cash flow ratios, and price/sales (P/S) ratios are commonly used to calculate estimates of expected future stock prices. This is done by multiplying an historical

average price ratio by an expected future value for the price-ratio denominator variable. For example, Table 6.1 summarizes such a price ratio analysis for Intel Corporation (INTC) based on midyear 1997 information.

Table 6.1. Price ratio analysis for Intel Corporation (INTC)

Mid-year 1997 stock price: $89.88

	Earnings (P/E)	Cash flow (P/CF)	Sales (P/S)
Current value per share	$3.49	$4.62	$12.67
Five-year average price ratio	13.5	9.6	3.0
Growth rate	42.7%	39.6%	34.3%
Expected stock price	$67.23	$61.92	$51.05

In Table 6.1, the current value row contains mid-year 1997 values for earnings per share, cash flow per share, and sales per share. The five-year average ratio row contains five-year average P/E, P/CF, and P/S ratios, and the growth rate row contains five-year historical average EPS, CFPS, and SPS growth rates.

The expected price row contains expected stock prices one year hence. The basic idea is this. Since Intel has had an average P/E ratio of 13.5, we will assume that Intel's stock price will be 13.5 times its earnings one year from now. To estimate Intel's earnings one year from now, we note that Intel's earnings have typically grown at a rate of 42.7 percent per year. If earnings continue to grow at this rate, then next year's earnings will be equal to this year's earnings multiplied by 1.427. Putting it all together, we have:

Expected price = Historical P/E ratio × Projected EPS

= Historical P/E ratio × Current EPS × (1 + Historical EPS growth rate)

= 13.5 × $3.49 × 1.427

= $67.23

The same procedure is used to calculate an expected price based on cash flow per share:

Expected price = P/CF ratio × CFPS × (1 + Cash flow growth rate)

= 9.6 × $4.62 × 1.396

= $61.92

Finally, an expected price based on sales per share is calculated as

Expected price = P/S ratio × SPS × (1 + Sales growth rate)

= 3.0 × $12.67 × 1.343

= $51.05

Notice that each price ratio method yields a different expected future price. This is normal. Since each method uses different information, each makes a different prediction. As Mark Twain once remarked: ?Prediction is difficult, especially about the future." We agree, especially since Intel's stock price was trading in the $90-$100 range in the second half of 1997, despite the fact that price ratio analysis suggested that Intel stock was overvalued.

An interesting and informative *Wall Street Journal* article discussing the limitations of price ratios in financial analysis is reproduced in the nearby Investment Updates box.

Investment Updates: Price Ratios

Example 6.14 Going to Disneyland Table 6.2 contains some information about Walt Disney Corporation. Calculate expected share prices using each of the three price ratio approaches we have discussed.

Table 6.2: Price ratio analysis for Walt Disney Corporation (DIS)

Mid-year 1997 stock price: $79.31

	Earnings (P/E)	Cash flow (P/CF)	Sales (P/S)
Current value per share	$2.66	$9.92	$32.21
5-year average price ratio	35.2	10.3	2.4
Growth rate	10.4%	25.4%	25.1%

Using the P/E approach, we come up with the following estimate of the price of Walt Disney stock in one year:

P/E approach: Expected price = Average P/E × Current EPS × (1 + growth rate)
= 35.2 × $2.66 × 1.104
= $103.37.

Check that the price-cash flow and price-sales approaches give estimates of $128.13 and $96.71, respectively. All of these prices suggest that Disney is potentially undervalued.

CHECK THIS

6.4a Why are high-P/E stocks sometimes called growth stocks?

6.4b Why might an analyst prefer a price-cash flow ratio to a price-earnings ratio?

6.5 An Analysis of the McGraw-Hill Company

Stock market investors have available to them many sources of information about the financial performance of companies with publicly traded stock shares. Indeed, the sheer volume of information available can often be overwhelming. For this reason, several sources publish reference summaries for individual companies.

One well-known example is the *Value Line Investment Survey*, a published reference with frequent updates. *Value Line* provides what many investors consider to be the best one-page company summaries available. Current updates to the *Value Line Investment Survey* are available at most stock brokerage offices and many public libraries. Figure 6.1 presents a partial one-page summary for the McGraw-Hill Corporation published by *Value Line* in late 1998. We will make frequent reference to information found in the *Value Line* summary in the discussion of McGraw-Hill.

Figure 6.1 about here

As shown in the title bar of Figure 6.1, McGraw-Hill stock trades on the New York Stock Exchange (NYSE) under the ticker symbol MHP. When this survey went to press, McGraw-Hill's stock price was $82, with a P/E ratio of 24.8. *Value Line* calculates a P/E ratio as the most recent stock price divided by the latest six month's earnings per share plus earnings per share estimated for the next six months. McGraw-Hill's relative P/E ratio of 1.49 is obtained by dividing its current P/E by the median P/E ratio of all stocks under review by *Value Line*. The dividend yield of 2.0 percent is calculated by dividing estimated dividends for the coming year by the current stock price.

At this point, as you look over *Value Line's* summary in Figure 6.1, you realize that *Value Line* has packed a considerable amount of information onto a single page. We acknowledge the efficiency of the *Value Line* one-page surveys by not trying to cover all items on the entire page. Most items are well-explained in Figure 6.2, which contains a complete sample page (see pp. 167-168). However, some items in Figure 6.1 differ from those in Figure 6.2 reflecting changes made by *Value Line*. In the following discussion, we refer only to information needed to illustrate the analytic methods discussed previously in this chapter.

Figure 6.2 about here

Our first task is to estimate a discount rate for McGraw-Hill. *Value Line* reports a beta of .90 for McGraw-Hill. Using a then-current Treasury bill rate of 4 percent and an historical stock market risk premium of 8.73 percent, we obtain a discount rate estimate for McGraw-Hill using the CAPM of 4% + (.90×8.73%) = 11.86%.

Our next task is to calculate a sustainable growth rate. *Value Line* reports projected 1998 earnings per share of $3.30, and dividends per share of $1.56. *Value Line* also reports a 1998 return on equity of ROE = 21.5 percent (reported as "Return on Shr. Equity"), implying a retention ratio of 1 - $1.56/$3.30 = 52.7%. Putting these together yields a sustainable growth rate of .527×21.5% = 11.33%.

Finally, with a discount rate and sustainable growth rate we can calculate a present value for McGraw-Hill stock. Using a constant perpetual growth model with the 1998 dividend of D(0) = $1.56 (calculated as four times the most recent quarterly dividend), a discount rate of k = 11.86 percent, and a growth rate of g = 11.33 percent, we calculate this present value of expected future dividends for McGraw-Hill stock:

$$V(0) = \frac{\$1.56(1.1133)}{.1186 - .1133}$$

$$= \$327.69$$

This present value of $327.69 is grossly higher than McGraw-Hill's $82 stock price, suggesting that the constant growth rate model is inappropriate for this company.

Value Line also reports annual growth rates for sales, cash flow, earnings, dividends, and book value in the box labelled "Annual Rates." These include historical 5-year and 10-year growth rates, along with expected growth rates for the next 3-5 years provided by *Value Line* analysts. These growth rates could also be used as a basis for present value calculations, and different answers would result.

We next turn to a price ratio analysis for McGraw-Hill. We will estimate expected future stock prices using five-year average price ratios that we will calculate along with expected growth rates supplied by *Value Line* analysts. The *Value Line* survey page reports annual average price-/earnings ratios, but does not report average price-cash flow ratios or average price-sales ratios. In this case, a quick way to calculate an average P/CF ratio is to multiply an average P/E ratio by the ratio of earnings per share over cash flow per share: P/CF = P/E × EPS / CFPS.

For example, McGraw-Hill's 1997 average P/E was 20.6, EPS was $2.91, and CFPS was $5.89. Thus a quick calculation of McGraw-Hill's 1997 average P/CF ratio is 20.6×2.91/5.89 = 10.18. Similarly, the 1997 average P/S ratio is 20.6×2.91/35.66 = 1.68. Average price ratio calculations for P/CF ratios and P/S ratios for the years 1993 through 1997 are provided in Table 6.3, along with five-year averages for each price ratio. Be sure that you understand where all the numbers come from.

Table 6.3: Price ratio calculations for McGraw-Hill Company (MHP)

	1993	1994	1995	1996	1997	Average
EPS	$1.75	$2.05	$2.28	$2.50	$2.91	$2.30
P/E	18.20	16.90	16.70	17.70	20.60	18.02
CFPS	$2.30	$4.36	$4.58	$4.91	$5.89	$4.41
P/CFPS	13.85	7.95	8.31	9.01	10.18	9.86
SPS	$22.22	$27.79	$29.31	$30.89	$35.66	$29.17
P/SPS	1.43	1.25	1.30	1.43	1.68	1.42

The five-year average price ratios calculated in Table 6.3 are used in the price ratio analysis in Table 6.4. The expected growth rates for earnings, cash flow, and sales provided by *Value Line* analysts are used to calculate expected stock prices for McGraw-Hill one year hence. For reference, the three formulas used to calculate expected prices are restated here:

Expected price = P/E ratio × EPS × (1 + Earnings growth rate)

Expected price = P/CF ratio × CFPS × (1 + Cash flow growth rate)

Expected price = P/S ratio × SPS × (1 + Sales growth rate)

Table 6.4: Price ratio analysis for McGraw-Hill (MHP)

Late 1998 stock price: $82

	Earnings (P/E)	Cash flow (P/CF)	Sales (P/S)
Current value per share	$3.30	$6.15	$38.35
Five-year average price ratio	18.02	9.86	1.42
Growth rate	12.50%	8.50%	8.50%
Expected stock price	$66.90	$65.79	$59.09

We can now summarize our analysis by listing the stock prices obtained by the methods described in this chapter along with the model used to derive them:

Dividend discount model: **$327.69**

Price-earnings model: **$66.90**

Price-cash flow model: **$65.79**

Price-sales model: **$59.09**

These price ratio methods suggest that McGraw-Hill stock might be overvalued at its then-current price of $82. Thus, we might cautiously conclude that McGraw-Hill stock is overvalued. However, only time will tell if this is so. It could simply be the case that the market is anticipating strong sales for this textbook, which is published by McGraw-Hill.

CHECK THIS

6.5a Locate *Value Line's* projected growth rate in dividends. How does it compare to the sustainable growth rate we estimated? Re-evaluate the stock price using the constant perpetual dividend model and this growth rate.

6.6 Summary and Conclusions

In this chapter, we examined several methods of fundamental analysis used by financial analysts to value common stocks. These methods belong to two categories: dividend discount models and price ratio models. We saw that:

1. Dividend discount models value common stock as the sum of all expected future dividend payments, where the dividends are adjusted for risk and the time value of money.

2 The dividend discount model is often simplified by assuming that dividends will grow at a constant growth rate. A particularly simple form of the dividend discount model is the case in which dividends grow at a constant perpetual growth rate. The simplicity of the constant perpetual growth model makes it the most popular dividend discount model. However, it should be applied only to companies with stable earnings and dividend growth.

3. Dividend models require an estimate of future growth. We described the sustainable growth rate, which is measured as a firm's return on equity times its retention ratio, and illustrated its use.

4. Companies often experience temporary periods of unusually high or low growth, where growth eventually converges to an industry average. In such cases, analysts frequently use a two-stage dividend growth model.

5. Price ratios are widely used by financial analysts. The most popular price ratio is a company's price-earnings ratio. A P/E ratio is calculated as the ratio of a firm's stock price divided by its earnings per share (EPS).

6. Financial analysts often refer to high-P/E stocks as growth stocks, and low-P/E stocks as value stocks. In general, companies with high expected earnings growth will have high P/E ratios, which is why high-P/E stocks are referred to as growth stocks. Low-P/E stocks are referred to as value stocks, because low-P/E stocks are viewed as cheap relative to current earnings.

7. Instead of price-earnings ratios, many analysts prefer to look at price-cash flow (P/CF) ratios. A price-cash flow ratio is measured as a company's stock price divided by its cash flow. Most analysts agree that cash flow can provide more information than net income about a company's financial performance.

8. An alternative view of a company's performance is provided by its price-sales (P/S) ratio. A price-sales ratio is calculated as the price of a company's stock divided by its annual sales revenue per share. A price-sales ratio focuses on a company's ability to generate sales growth. A high P/S ratio suggests high sales growth, while a low P/S ratio suggests low sales growth.

9. A basic price ratio for a company is its price-book (P/B) ratio. A price-book ratio is measured as the market value of a company's outstanding common stock divided by its book value of equity. A high P/B ratio suggests that a company is potentially expensive, while a low P/B value suggests that a company may be cheap.

10. A common procedure using price-earnings ratios, price-cash flow ratios, and price-sales ratios is to calculate estimates of expected future stock prices. However, each price ratio method yields a different expected future stock price. Since each method uses different information, each makes a different prediction.

Key terms

fundamental analysis
dividend discount model
constant growth rate model
constant perpetual growth
sustainable growth rate
retained earnings
payout ratio
retention ratio
beta
two-stage dividend growth model
book value of equity
price-book ratio
price-earnings ratio
earnings yield
growth stocks
value stocks
price-cash flow ratio
cash flow
price-sales ratio

Get Real!

This chapter introduced you to some of the basics of common stock valuation and fundamental analysis. It focused on two important tools used by stock analysts in the real world to assess whether a particular stock is "rich" or "cheap:" dividend discount models and price ratio analysis. How should you, as an investor or investment manager, put this information to use?

The answer is you need to pick some stocks and get to work! As we discussed in the chapter, experience and judgment are needed in using these models, and the only way to obtain these is through practice. Try to identify a few stocks that look cheap and buy them in a simulated brokerage account such as Stock-Trak. At the same time, find a few that look rich and short them.

As time passes, your analyses may prove to be correct or incorrect, but the only way to get started is to apply the tools and witness the outcomes. If your cheap stocks get cheaper, try to understand what you missed. It may be that you are correct, but not enough time has passed. There is an old bit of Wall Street wisdom that goes like this: If you thought stock in Company X was cheap at $40 a share, you've got to love it if the price falls to $20!

Similarly, if your rich stocks get richer, should you hold your position or fold? You may be correct, in which case patience will be rewarded. Of course, with a short position, the penalty for being incorrect is potentially unlimited!

The other thing to do is to start studying P/E ratios. Scan the *Wall Street Journal* (or a similar source of market information) and look at the range of P/Es. What's a low P/E? What's a high one? Do they really correspond to what you would call growth and value stocks? Once again, you should pick a few of each type and invest in them to learn more about value versus growth investing.

STOCK-TRAK FAST TRACK

DOGS OF THE DOW STOCK TRADING WITH STOCK-TRAK

A popular investment strategy that many investment advisors recommend to their clients is the so-called "dogs of the Dow" strategy. Under this strategy, an investor ranks the 30 stocks in the Dow Jones Industrials average according to their dividend yields. The investor then buys the 5 Dow stocks with the lowest dividend yields. Six months or a year later, the 5 stocks in the DJIA with the lowest dividend yields are again identified and the investor switches funds into these stocks. This strategy has gained a reputation for often outperforming the entire 30-stock Dow average.

If you would like to try the dogs of the Dow strategy with your Stock-Trak account, obtain the names of the 30 stocks in the DJIA from the *Wall Street Journal*. Next, find these stocks in the *Wall Street Journal* stock price listings and record their dividnd yields. Identify the 5 Dow stocks with the lowest dividend yields and, just for fun, also record the 5 Dow stocks with the highest dividend yields. You might try investing all your Stock-Trak funds in the low-dividend Dow stocks following a pure dogs of the Dow strategy. Alternatively, you can invest half of your funds in the low-dividend Dow stocks and the other half in the high-dividend Dow stocks and then compare which dividend strategy performs the best.

VALUE VERSUS GROWTH STOCK TRADING WITH STOCK-TRAK

Portfolio managers often pursue investment strategies based on either value stocks or growth stocks. With Stock-Trak you can try out these strategies yourself. Looking through the *Wall Street Journal* stock price listings, identify several low P/E stocks and several high P/E stocks. Try to find

P/E ratios below 10 for the low P/E stocks and P/E ratios greater than 40 for the high P/E stocks. Use the low P/E stocks to form a *value* portfolio and the high P/E stocks to form a *growth* portfolio.

Using your Stock-Trak account, you can try several strategies based on your value and growth portfolios. You can invest all your Stock-Trak funds in the value portfolio or you can invest all your funds in the growth portfolio. Alternatively, you can invest half of your funds in each of the value and growth portfolios and compare which strategy performs the best.

STOCK-TRAK EXERCISES

1. In a more sophisticated version of the dogs of the Dow strategy, you buy the low-dividend Dow stocks and short sell the high-dividend Dow stocks. This strategy requires a little more effort but the results might be a little more interesting.
2. A similarly sophisticated strategy can be based on value stocks versus growth stocks. If you believe value stocks will outperform growth stocks, then you buy low-P/E stocks and short sell high-P/E stocks. But if you believe growth stocks will outperform value stocks, then you buy high-P/E stocks and short sell low-P/E stocks.

Chapter 6
Common Stock Valuation

End of Chapter Questions and Problems

Review Problems and Self-Test

1. **The Perpetual Growth Model** Suppose dividends for a particular company are projected to grow at 6 percent forever. If the discount rate is 16 percent and the current dividend is $2, what is the value of the stock?

2. **The Two-stage Growth Model** Suppose the Titanic Ice Cube Co.'s dividend grows at a 20 percent rate for the next three years. Thereafter, it grows at a 12 percent rate. What value would we place on Titanic assuming a 15 percent discount rate? Titanic's most recent dividend was $3.

3. **Price Ratio Analysis** The table below contains some information about the Jordan Air Co. Provide expected share prices using each of the three price ratio approaches we have discussed.

Price ratio analysis for Jordan Air

Current stock price: $40

	Earnings (P/E)	Cash flow (P/CF)	Sales (P/S)
Current value per share	$2.00	$6.00	$30.00
5-year average price ratio	25	7	1.5
Growth rate	10%	16%	14%

Answers to Self-Test Problems

1. Plugging the relevant numbers into the constant perpetual growth formula results in

$$V(0) = \frac{\$2(1.06)}{.16 - .06} = \$21.20$$

As shown, the stock should sell for $21.20.

2. Plugging in all the relevant numbers into the two-stage formula gets us

$$V(0) = \frac{\$3(1.20)}{.15 - .20}\left(1 - \left(\frac{1.20}{1.15}\right)^3\right) + \left(\frac{1.20}{1.15}\right)^3 \frac{\$3(1.12)}{.15 - .12}$$

$$= \$9.81 + \$127.25$$

$$= \$137.06$$

Thus, the stock should go for about $137.

3. Using the P/E approach, we come up with the following estimate of the price of Jordan Air in one year:

Expected price = Average P/E × Current EPS × (1 + growth rate)
= 25 × $2 × 1.10
= $55.

Using the P/CF approach we get

Expected price = Average P/CF × Current CFPS × (1 + growth rate)
= 7 × $6 × 1.16
= $48.72.

Finally, using the P/S approach we get

Expected price = Average P/S × Current SPS × (1 + growth rate)
= 1.5 × $30 × 1.14
= $51.30.

Test Your IQ (Investment Quotient)

1. **Sustainable growth** A company has a return on equity of ROE = 20 percent, and, from earnings per share of EPS = $5, it pays a $2 dividend. What is the company's sustainable growth rate?

a. 8 percent
b. 10 percent
c. 12 percent
d. 20 percent

2. **Sustainable growth** If the return on equity for a firm is 15 percent and the retention ratio is 40 percent, the sustainable growth rate of earnings and dividends is which of the following? (*1994 CFA exam*)

a. 6 percent
b. 9 percent
c. 15 percent
d. 40 percent

3. **Dividend discount model** Suppose a security pays a current dividend of $5 and all future dividends will grow at a rate of 8 percent per year forever. Assuming the appropriate discount rate is 12 percent, what is the value of this security?

a. $135
b. $270
c. $13.50
d. $1,350

4. **Dividend discount model** The constant-growth dividend discount model will not produce a finite value if the dividend growth rate is which of the following? (*1994 CFA exam*)

a. above its historical average
b. above the required rate of return
c. below its historical average
d. below the required rate of return

5. **Dividend discount model** In applying the constant-growth dividend discount model, a stock's intrinsic value will be which of the following when the required rate of return is lowered? (*1994 CFA exam*)

a. decrease
b. increase
c. remain unchanged
d. decrease or increase, depending on other factors

6. **Dividend discount model** The constant-growth dividend discount model would typically be most appropriate for valuing the stock of which of the following? (*1994 CFA exam*)

a. new venture expected to retain all earnings for several years
b. rapidly growing company
c. moderate growth, mature company
d. company with valuable assets not yet generating profits

7. **Dividend discount model** A stock has a required return of 15 percent, a constant growth rate of 10 percent, and a dividend payout ratio of 50 percent. What should the stock's P/E ratio should be? (*1994 CFA exam*)

a. 3.0
b. 4.5
c. 9.0
d. 11.0

8. **CAPM discount rate** If the U.S. Treasury bill rate is 5 percent and the stock market risk premium is 8 percent, then the CAPM discount rate for a security with a beta of 1.25 is

a. 12 percent
b. 13 percent
c. 14.25 percent
d. 15 percent

9. **CAPM discount rate** If the U.S. Treasury bill rate is 5 percent and the stock market risk premium is 8 percent, then the CAPM discount rate for a security with a beta of .75 is

a. 6 percent
b. 8 percent
c. 11 percent
d. 13 percent

10. Dividend discount model A stock will not pay dividends until three years from now. The dividend then will be $2.00 per share, the dividend payout ratio will be 40 percent, and return on equity will be 15 percent. If the required rate of return is 12 percent, which of the following is closest to the value of the stock? (*1994 CFA exam*)

a. $27
b. $33
c. $53
d. $67

11. Dividend discount model Assume that at the end of the next year, Company A will pay a $2.00 dividend per share, an increase from the current dividend of $1.50 per share. After that, the dividend is expected to increase at a constant rate of 5 percent. If you require a 12 percent return on the stock, what is the value of the stock? (*1991 CFA exam*)

a. $28.57
b. $28.79
c. $30.00
d. $31.78

12. Dividend discount model A share of stock will pay a dividend of $1.00 one year from now, with dividend growth of 5 percent thereafter. In the context of a dividend discount model, the stock is correctly priced at $10 today. According to the constant dividend growth model, if the required return is 15 percent, what should the value of the stock two years from now? (*1994 CFA exam*)

a. $11.03
b. $12.10
c. $13.23
d. $14.40

13. Cash flow Which of the following best defines cash flow?

a. net income plus depreciation
b. net income minus depreciation
c. net income plus taxes minus depreciation
d. net income plus taxes divided by depreciation

14. **Price ratios** Two similar companies have the same price-sales and price-earnings ratios. However, company A has a lower price-cash flow ratio than company B. This most likely simply indicates that

a. A has lower quality earnings than B
b. A has lower quality cash flow than B
c. A uses straight-line depreciation, while B uses accelerated depreciation
d. A uses accelerated depreciation, while B uses straight-line depreciation

15. **Price ratios** Two similar companies acquire substantial new production facilities, which they both will depreciate over a 10-year period. However, Company A uses accelerated depreciation while Company B uses straight-line depreciation. In the first year that the assets are depreciated, which of the following is most likely to occur?

a. A's P/CF ratio will be higher than B's
b. A's P/CF ratio will be lower than B's
c A's P/E ratio will be higher than B's
d. A's P/E ratio will be lower than B's

Chapter Questions and Problems

Core Questions

1. **Dividend discount model** What is the basic principle behind dividend discount models?

2. **P/E ratios** Why do growth stocks tend to have higher P/E ratios than value stocks?

3. **Earnings yields** What is the earnings yield on a stock?

4. **Cash flow** In computing the price-cash flow ratio, how is cash flow per share usually measured?

5. **Dividend valuation** CJ Industries will pay a regular dividend of $3.50 per share for each of the next three years. At the end of the three years, the company will also pay out a $40 per share liquidating dividend, and the company will cease operations. If the discount rate is 9 percent, what is the current value of the company's stock?

6. **Dividend valuation** In the previous problem, suppose the current share price is $50. If all other information remains the same, what must the liquidating dividend be?

7. **Dividend discount model** Trust Bankers just paid an annual dividend of $2 per share. The expected dividend growth rate is 5 percent, the discount rate is 10 percent, and the dividends will last for 5 more years. What is the value of the stock? What if the dividends last for 10 more years? 30 years? 100 years?

8. **Dividend discount model** Apple Grove, Inc., will pay dividends for the next 10 years. The expected dividend growth rate for this firm is 8 percent, the discount rate is 15 percent, and the stock currently sells for $25 per share. How much must the most recent dividend payment have been?

9. **Dividend growth model** Suppose that Kojak, Inc., just paid a dividend of $3.75 per share. The company will continue to pay dividends for the next 20 years, and then go out of business. If the discount rate is 12 percent per year, what is the value of stock for a dividend growth rate of 20 percent? 12 percent? 6 percent? 0 percent? –5 percent?

10. **Perpetual dividend growth** Atlantis Seafood Company stock currently sells for $70 per share. The company is expected to pay a dividend of $4 per share next year, and analysts project that dividends should increase at 4 percent per year for the indefinite future. What must the relevant discount rate be for Atlantis stock?

11. **Perpetual dividend growth** Xytex Products just paid a dividend of $1.25 per share, and the stock currently sells for $25. If the discount rate is 15 percent, what is the dividend growth rate?

12. **Perpetual dividend growth** Sturgis Light & Power increases its dividend 5 percent per year every year. This utility is valued using a discount rate of 8 percent, and the stock currently sells for $85 per share. If you buy a share of stock today and hold on to it for at least three years, what do you expect the value of your dividend check to be three years from today?

13. **Sustainable growth** Johnson Products earned $12.50 per share last year and paid a $5 per share dividend. If ROE was 20 percent, what is the sustainable growth rate?

14. **Sustainable growth** Caterwallar stock has a sustainable growth rate of 5 percent, ROE of 20 percent, and dividends per share of $3.00. If the P/E ratio is 15, what is the value of a share of stock?

Intermediate Questions

15. **Multiple growth rates** Netscrape Communications does not currently pay a dividend. You expect the company to begin paying a $3 per share dividend in 5 years, and you expect dividends to grow perpetually at 12 percent per year thereafter. If the discount rate is 15 percent, how much is the stock currently worth?

16. **Multiple growth rates** PerfectlySoft Corp. is experiencing rapid growth. Dividends are expected to grow at 30 percent per year during the next three years, 20 percent over the following year, and then 6 percent per year thereafter indefinitely. The required return on this stock is 15 percent, and the stock currently sells for $42.50 per share. What is the projected dividend for the coming year?

17. **Multiple growth rates** Callaway Corporation is expected to pay the following dividends over the next four years: $2.25, $4.00, $3.00, $1.00. Afterwards, the company pledges to maintain a constant 8 percent growth rate in dividends forever. If the required return on the stock is 16 percent, what is the current share price?

18. **Multiple growth rates** My Money, Inc., just paid a dividend of $2.50 per share on its stock. The growth rate in dividends is expected to be a constant 6.5 percent per year indefinitely. Investors require a 20 percent return on the stock for the first three years, then a 15 percent return for the next three years, and then a 10 percent return thereafter. What is the current share price for My Money?

19. **Price ratio analysis** Given the information below, compute the expected share price at the end of 2000 using price ratio analysis.

Year	1994	1995	1996	1997	1998	1999
Price	$28	$35	$32	$44	$48	$50
EPS	2.00	2.25	2.30	3.15	3.45	3.75
CFPS	8.00	8.75	8.25	10.00	11.00	11.40
SPS	50	58	55	72	80	86

20. **Dividend growth analysis** In the previous problem, suppose dividends per share over this same period were $.75, $.80, $.80, $1.00, $1.10, and $1.20, respectively. Compute the expected share price for 2000 by the perpetual dividend growth method. Assume the market risk premium is 8.5 percent, Treasury bills yield 5 percent, and the projected beta of this firm is 1.10.

Chapter 6
Common Stock Valuation

Answers and solutions

Answers to Multiple Choice Questions

1. C
2. A
3. A
4. B
5. B
6. C
7. D
8. D
9. C
10. C
11. A
12. C
13. A
14. D
15. D

Answers to Chapter Questions and Problems

Core Questions

1. The basic principle is that we can value a share of stock by computing the present value of all future dividends.

2. P/E ratios measure the price of a share of stock relative to current earnings. All else the same, future earnings will be larger for a growth stock than a value stock, so investors will pay more relative to today's earnings.

3. The earnings yield is earnings per share divided by price per share, i.e., the reciprocal of the P/E ratio.

4. It is computed by taking net income plus depreciation and then dividing by the number of shares outstanding.

5. $V(0) = \$3.50/(1.09)^1 + \$3.50/(1.09)^2 + \$3.50/(1.09)^3 + \$40/(1.09)^3 = \$39.75$

6. $V(0) = \$3.50/(1.09)^1 + \$3.50/(1.09)^2 + \$3.50/(1.09)^3 + \$LD/(1.09)^3 = \$50$

With a little calculation, we get that the liquidating dividend (LD) must be \$53.28.

7. $V(0) = [\$2(1.05)/(.10 - .05)][1 - (1.05/1.10)^5] = \$8.72$
$V(0) = [\$2(1.05)/(.10 - .05)][1 - (1.05/1.10)^{10}] = \$15.62$
$V(0) = [\$2(1.05)/(.10 - .05)][1 - (1.05/1.10)^{30}] = \$31.60$
$V(0) = [\$2(1.05)/(.10 - .05)][1 - (1.05/1.10)^{100}] = \$41.60$

8. $V(0) = \$25 = [D(1.08)/(.15 - .08)][1 - (1.08/1.15)^{10}]$; $D = \$3.47$

9. $V(0) = [\$3.75(1.20)/(.12 - .20)][1 - (1.20/1.12)^{20}] = \$167.31$
$V(0) = (20)\$3.75 = \$75.00$
$V(0) = [\$3.75(1.06)/(.12 - .06)][1 - (1.06/1.12)^{20}] = \$44.22$
$V(0) = [\$3.75(1.00)/(.12 - 0)][1 - (1.00/1.12)^{20}] = \$28.01$
$V(0) = [\$3.75(0.95)/(.12 + .05)][1 - (0.95/1.12)^{20}] = \$20.18$

10. $V(0) = \$70 = \$4/(k-.04)$, $k = .04 + 4/70 = 9.71\%$

11. $V(0) = \$25 = [\$1.25(1+g)]/(.15-g)$; $g = 9.524\%$

12. $V(0) = \$85 = D(1)/(.08 - .05)$; $D(1) = \$2.55$
$D(3) = \$2.55(1.05)^2 = \$2.81$

13. Retention ratio = $1 - (\$5/\$12.50) = .60$
Sustainable growth rate = $.20(.60) = 12\%$

14. Sustainable growth = $.05 = .20r$; retention ratio = .25
Payout ratio = $1 - .25 = .75 = D/NI = \$3/NI$; $NI = 3/.75 = \$4 = EPS$
P/E = 15, EPS = \$4, so $V(0) = 4(15) = \$60$

Intermediate Questions

15. $V(5) = \$3(1.12)/(.15-.12) = \$112$
$V(0) = \$112/(1.15)^5 = \$55.68$

16. $D(3) = D(0)(1.3)^3$; $D(4) = D(0)(1.3)^3(1.2)$
$V(4) = D(4)(1+g)/(k-g) = D(0)(1.3)^3(1.2)(1.06)/(.15-.06) = 31.05D(0)$
$V(0) = \$42.50 = D(0)\{ (1.3/1.15) + (1.3/1.15)^2 + (1.3/1.15)^3 + [1.3^3(1.2) + 31.05]/1.15^4 \}$
$D(0) = 42.50/23.11 = 1.84$; $D(1) = 1.84(1.3) = \$2.39$

17. $V(4) = \$1.00(1.08)/(.16-.08) = \$13.50$
$V(0) = \$2.25/1.16 + \$4.00/1.16^2 + \$3.00/1.16^3 + \$14.50/1.16^4 = \$14.84$

18. $V(6) = D(7)/(k–g) = \$2.50(1.065)^7/(.10–.065) = \$111$
$V(3) = \$2.50(1.065)^4/1.15 + \$2.50(1.065)^5/1.15^2 + \$2.50(1.065)^6/1.15^3 + \$111/1.15^3 = \$80.77$
$V(0) = \$2.50(1.065)/1.2 + \$2.50(1.065)^2/1.2^2 + \$2.50(1.065)^3/1.2^3 + \$80.77/1.2^3 = \$52.68$

19. P/E ratio: values are 14, 15.56, 13.91, 13.97, 13.91, 13.33 ; average = 14.11
Average EPS 5-year growth rate = 13.98%
Expected share price = 14.11(3.75)(1.1398) = \$60.31
P/CFPS: values are 3.50, 4.00, 3.88, 4.40, 4.36, 4.39 ; average = 4.09
Average CFPS 5-year growth rate = 7.70%
Expected share price = 4.09(11.40)(1.077) = \$50.22
P/S: values are .560, .603, .582, .611, .600, .581 ; average = .590
Average sales 5-year growth rate = 12.07%
Expected share price = .590(86)(1.1207) = \$56.86

A reasonable price range would seem to be \$50 to \$60 per share.

20. $k = .05 + 1.1(.085) = 14.35\%$
Historical average dividend growth rate = 10.15%
$V(0) = \$1.20(1.1015)/(.1435–.1015) = \$31.47$

Book Value Rarely Required Reading Now

HEARD ON THE STREET

By JONATHAN CLEMENTS
Staff Reporter of THE WALL STREET JOURNAL

NEW YORK – Money managers are closing the book on book value.

Bargain-hunting investors used to pay a lot of attention to book value, namely a company's assets minus its liabilities. But now even die-hard fans concede that this measure of a company's worth has lost much of its meaning because of new accounting rules, share buybacks and write-offs.

"I was a big proponent of book value," says Richard Fontaine, a Towson, Md., stock-picker with $270 million under management. "But it's very difficult to use it as a yardstick anymore. The distortions have gotten so big that it's got rid of most of the value."

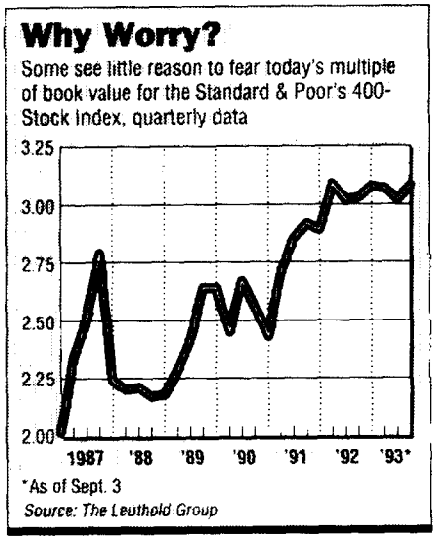
For value investors, who favor beaten-down stocks that are cheap compared with corporate assets, book value used to provide an easy way to find bargains. All you had to do was compare a company's stock price with its book value on a per-share basis, which can be calculated using the balance sheet in a company's annual report. Value investors would often be drawn to companies whose shares were trading near or below book value.

These days, however, few stocks are at such depressed levels. According to the Leuthold Group, a Minneapolis research firm, the companies in the Standard & Poor's 400-stock index are trading at an astounding 3.1 times book value, higher even than at the 1987 stock market peak. Part of the reason is lofty stock prices. But also important has been the shrinking book value of many companies.

"Book-value measurements have gone through so many changes as to be almost meaningless," says Wayne Nordberg, partner in charge of equity investments at New York's Lord Abbett & Co. "We look at it. But it doesn't occupy the same position in our analytical process as it did five or 10 years ago."

Why was book value considered so important? It reflects the amount of money invested in a company through issuing stock and retained earnings. If a company's shares are below book value, they are in effect trading for less than the capital invested in the firm.

For investors anxious to find cheap stocks, that may be an appetizing prospect. Unfortunately, book value is more than simply the sum of equity capital raised and earnings retained.



Mr. Nordberg says many companies have seen their book values shrink sharply because of share repurchases, write-offs caused by corporate restructurings and the adoption of a new accounting rule that requires the setup of a reserve to cover retiree health benefits. Many money managers believe these items sometimes artificially depress a company's book value.

Last year, for instance, **General Motors**' book value shrank to $8.47 a share from $42.89, in large part because of new accounting rules regarding retiree benefits. At **Dayton Hudson**, book value fell between year-end 1986 and year-end 1989, as the retailer bought large chunks of its own stock. In recent years, **International Business Machines**' book value has shriveled as the computer giant took write-offs to cover its restructuring.

As individual companies have taken hits to their book value, the stock market has started to appear increasingly expensive based on price-to-book multiples. The trend prompted Goldman Sachs's market strategist Abby Cohen to issue a report saying "investors should not conclude that market valuation has worsened."

Investment Updates (2/7/95)

Flaws in Market Gauges

By JONATHAN CLEMENTS
Staff Reporter of THE WALL STREET JOURNAL

NEW YORK – Even before last week's impressive rally, the stock market was outrageously expensive. At least that's what some key market yardsticks show.

But hold on to your sell orders. Many investment experts reckon the fault lies not with the market, but with the measuring sticks. In particular, these experts see serious shortcomings in three popular stock-market gauges: the price-to-book value ratio, dividend yield and the price-to-earnings multiple.

The three standard measures "are all flawed in some way," says Frazier Evans, senior economist at Colonial Group, the Boston mutual-fund company. "You have to look under the surface. I'd say that the market is not as expensive as it looks."

Dwindling Dividends

Consider, for instance, the market's dividend yield. The companies in the Standard & Poor's 500-stock index are paying annual dividends amounting to 2.8% of their current stock prices. That's well below the historical average dividend yield of 4.7% and not far above the all-time low of 2.64%, which was hit in 1987, just before that year's stock-market crash.

A danger signal? Maybe not. The reason is that corporations seem to be paying out far less of their earnings as dividends these days. Instead, companies are using profits to expand their businesses and buy their own shares – actions designed to boost stock prices.

The shift should please most investors. Because dividend income is taxed more heavily than capital gains, shareholders benefit more if returns come in the form of higher stock prices, rather than big dividends.

The dividend-yield gauge also is being thrown out of whack by other factors, says Arnold Kaufman, editor of Standard & Poor's Outlook, a weekly newsletter. For instance, "dividends are being held down by the special problems of large dividend-paying industry groups, such as telephones, utilities and drugs," he says.

Effect on Book Value

At first blush, the market's price-to-book value also suggests shares are richly priced. Bargain hunters often look for stocks that are trading below book value, which is the difference between a company's assets and its liabilities expressed on a per-share basis.

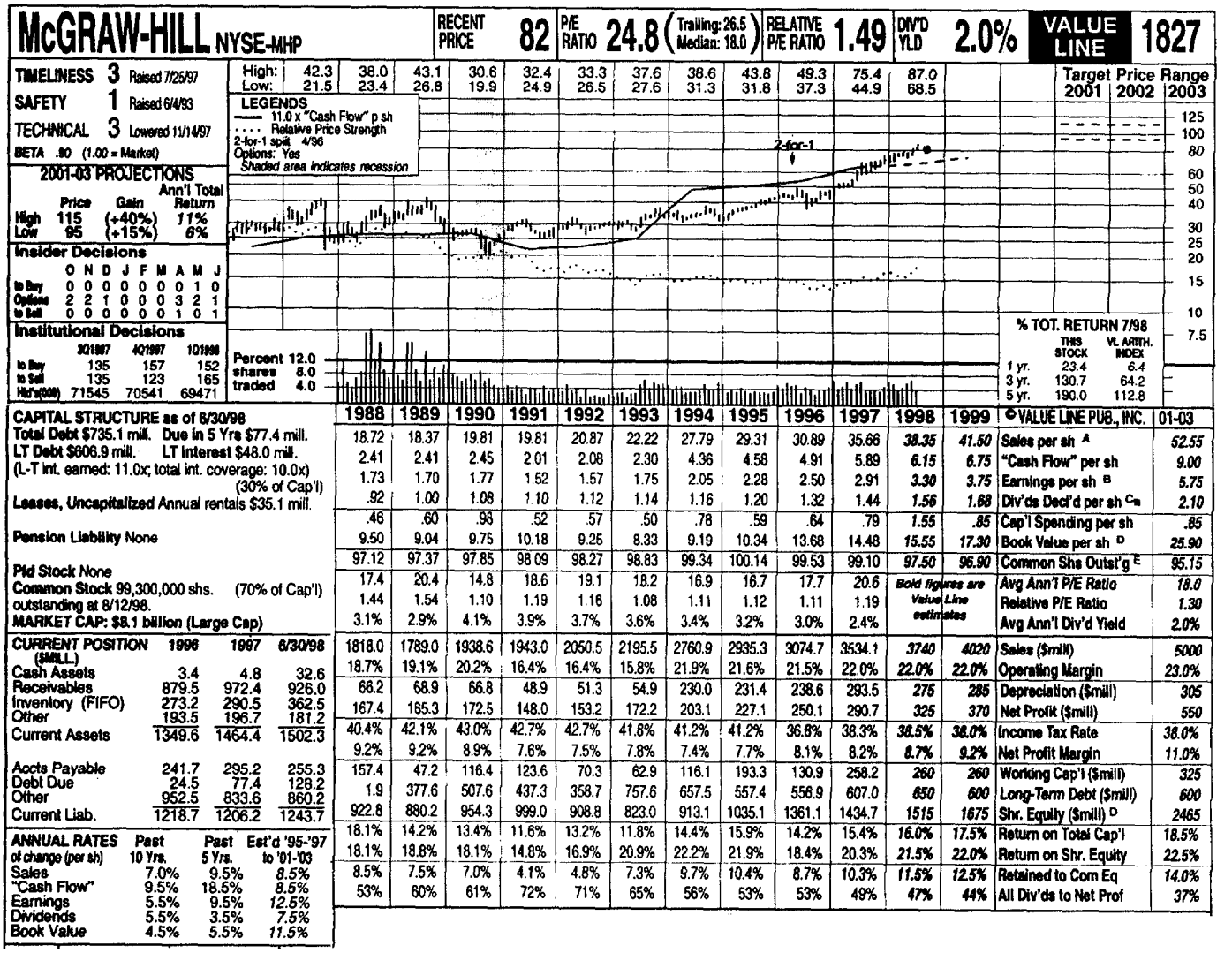
But these days, precious few stocks trade below book value. Indeed, Mr. Kaufman figures stocks on average are trading at more than three times book value, compared with just 1.2 times book in the late 1970s.

But once again, the measuring gauge may be faulty. Book value has been distorted by share repurchases, special charges due to corporate restructurings and the adoption of a new accounting rule concerning retiree health benefits. "Price-to-book value has lost a lot of its usefulness," Mr. Kaufman concludes.

What about price-to-earnings multiples? Right now, the market is trading at about 15 times expected 1995 earnings, a tad above the historical average. "There are fewer problems with P/E ratios than with the other two measures," says Kathleen Crowley, a senior vice president with Chicago's Stratford Advisory Group.

Even so, earnings multiples also can mislead. In recent years, reported earnings have been depressed by special charges. In addition, experts say the market's earnings multiple shouldn't be viewed in isolation, but instead should be considered in the context of items like interest rates and inflation.

Figure 6.1. Value Line Analysis Sheet



McGRAW-HILL NYSE-MHP

RECENT PRICE 82 | P/E RATIO 24.8 (Trailing: 26.5 / Median: 18.0) | RELATIVE P/E RATIO 1.49 | DIV'D YLD 2.0% | VALUE LINE 1827

TIMELINESS 3 Raised 7/25/97
SAFETY 1 Raised 6/4/93
TECHNICAL 3 Lowered 11/14/97
BETA .80 (1.00 = Market)

2001-03 PROJECTIONS

	Price	Gain	Ann'l Total Return
High	115	(+40%)	11%
Low	95	(+15%)	6%

Insider Decisions

	O	N	D	J	F	M	A	M	J
to Buy	0	0	0	0	0	0	0	1	0
Options	2	2	1	0	0	0	3	2	1
to Sell	0	0	0	0	0	0	1	0	1

Institutional Decisions

	3Q1997	4Q1997	1Q1998
to Buy	135	157	152
to Sell	135	123	165
Hld's(000)	71545	70541	69471

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	© VALUE LINE PUB., INC.	01-03
High:	42.3	38.0	43.1	30.6	32.4	33.3	37.6	38.6	43.8	49.3	75.4	87.0		
Low:	21.5	23.4	26.8	19.9	24.9	26.5	27.6	31.3	31.8	37.3	44.9	68.5		
	18.72	18.37	19.81	19.81	20.87	22.22	27.79	29.31	30.89	35.66	*38.35*	*41.50*	Sales per sh [A]	*52.55*
	2.41	2.41	2.45	2.01	2.08	2.30	4.36	4.58	4.91	5.89	*6.15*	*6.75*	"Cash Flow" per sh	*9.00*
	1.73	1.70	1.77	1.52	1.57	1.75	2.05	2.28	2.50	2.91	*3.30*	*3.75*	Earnings per sh [B]	*5.75*
	.92	1.00	1.08	1.10	1.12	1.14	1.16	1.20	1.32	1.44	*1.56*	*1.68*	Div'ds Decl'd per sh [C]	*2.10*
	.46	.60	.98	.52	.57	.50	.78	.59	.64	.79	*1.55*	*.85*	Cap'l Spending per sh	*.85*
	9.50	9.04	9.75	10.18	9.25	8.33	9.19	10.34	13.68	14.48	*15.55*	*17.30*	Book Value per sh [D]	*25.90*
	97.12	97.37	97.85	98.09	98.27	98.83	99.34	100.14	99.53	99.10	*97.50*	*96.90*	Common Shs Outst'g [E]	*95.15*
	17.4	20.4	14.8	18.6	19.1	18.2	16.9	16.7	17.7	20.6	*Bold figures are Value Line estimates*		Avg Ann'l P/E Ratio	*18.0*
	1.44	1.54	1.10	1.19	1.16	1.08	1.11	1.12	1.11	1.19			Relative P/E Ratio	*1.30*
	3.1%	2.9%	4.1%	3.9%	3.7%	3.6%	3.4%	3.2%	3.0%	2.4%			Avg Ann'l Div'd Yield	*2.0%*
	1818.0	1789.0	1938.6	1943.0	2050.5	2195.5	2760.9	2935.3	3074.7	3534.1	*3740*	*4020*	Sales ($mill)	*5000*
	18.7%	19.1%	20.2%	16.4%	16.4%	15.8%	21.9%	21.6%	21.5%	22.0%	*22.0%*	*22.0%*	Operating Margin	*23.0%*
	66.2	68.9	66.8	48.9	51.3	54.9	230.0	231.4	238.6	293.5	*275*	*285*	Depreciation ($mill)	*305*
	167.4	165.3	172.5	148.0	153.2	172.2	203.1	227.1	250.1	290.7	*325*	*370*	Net Profit ($mill)	*550*
	40.4%	42.1%	43.0%	42.7%	42.7%	41.8%	41.2%	41.2%	36.8%	38.3%	*38.5%*	*38.0%*	Income Tax Rate	*38.0%*
	9.2%	9.2%	8.9%	7.6%	7.5%	7.8%	7.4%	7.7%	8.1%	8.2%	*8.7%*	*9.2%*	Net Profit Margin	*11.0%*
	157.4	47.2	116.4	123.6	70.3	62.9	116.1	193.3	130.9	258.2	*260*	*260*	Working Cap'l ($mill)	*325*
	1.9	377.6	507.6	437.3	358.7	757.6	657.5	557.4	556.9	607.0	*650*	*600*	Long-Term Debt ($mill)	*600*
	922.8	880.2	954.3	999.0	908.8	823.0	913.1	1035.1	1361.1	1434.7	*1515*	*1675*	Shr. Equity ($mill) [D]	*2465*
	18.1%	14.2%	13.4%	11.6%	13.2%	11.8%	14.4%	15.9%	14.2%	15.4%	*16.0%*	*17.5%*	Return on Total Cap'l	*18.5%*
	18.1%	18.8%	18.1%	14.8%	16.9%	20.9%	22.2%	21.9%	18.4%	20.3%	*21.5%*	*22.0%*	Return on Shr. Equity	*22.5%*
	8.5%	7.5%	7.0%	4.1%	4.8%	7.3%	9.7%	10.4%	8.7%	10.3%	*11.5%*	*12.5%*	Retained to Com Eq	*14.0%*
	53%	60%	61%	72%	71%	65%	56%	53%	53%	49%	*47%*	*44%*	All Div'ds to Net Prof	*37%*

Target Price Range 2001 | 2002 | 2003

% TOT. RETURN 7/98

	THIS STOCK	VL ARITH. INDEX
1 yr.	23.4	6.4
3 yr.	130.7	64.2
5 yr.	190.0	112.8

CAPITAL STRUCTURE as of 6/30/98
Total Debt $735.1 mill. Due in 5 Yrs $77.4 mill.
LT Debt $606.9 mill. LT Interest $48.0 mill.
(L-T int. earned: 11.0x; total int. coverage: 10.0x)
(30% of Cap'l)
Leases, Uncapitalized Annual rentals $35.1 mill.

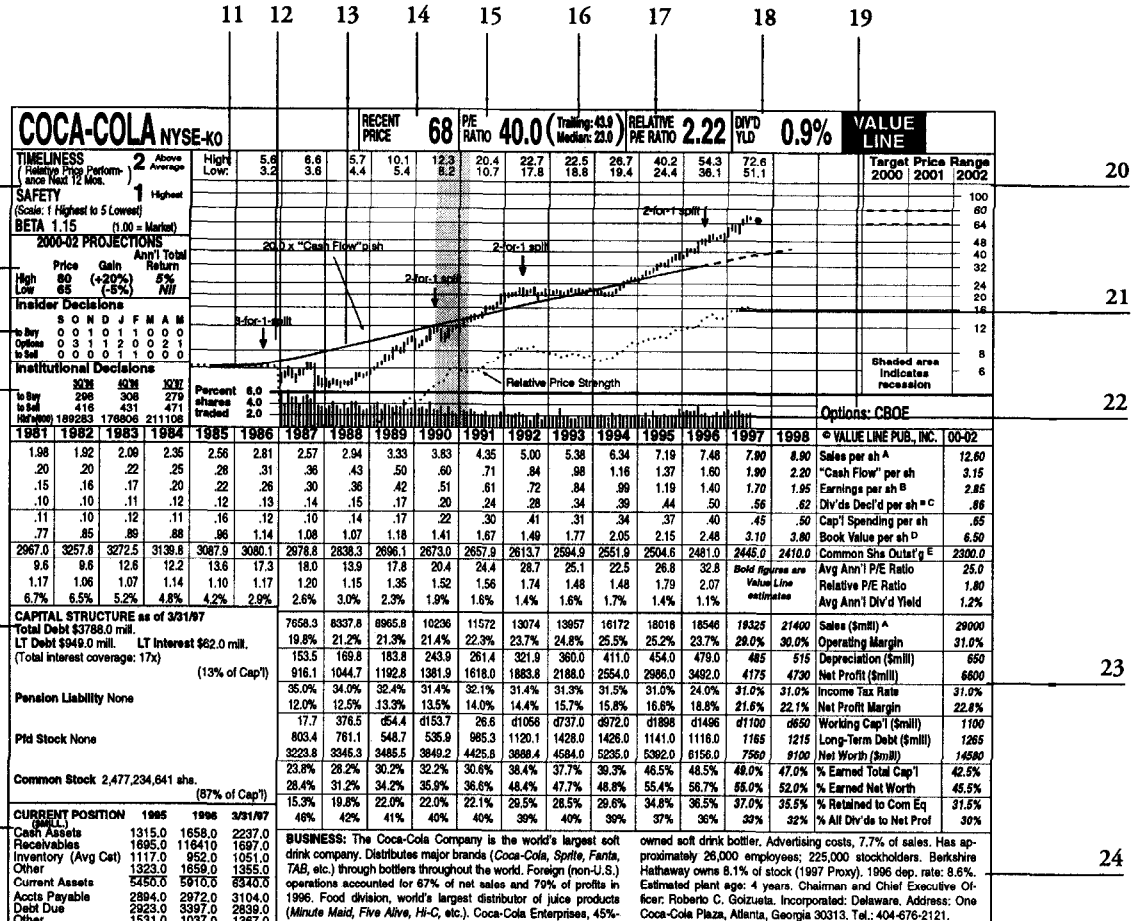
Pension Liability None

Pfd Stock None
Common Stock 99,300,000 shs. (70% of Cap'l)
outstanding at 8/12/98.
MARKET CAP: $8.1 billion (Large Cap)

CURRENT POSITION ($MILL.)	1996	1997	6/30/98
Cash Assets	3.4	4.8	32.6
Receivables	879.5	972.4	926.0
Inventory (FIFO)	273.2	290.5	362.5
Other	193.5	196.7	181.2
Current Assets	1349.6	1464.4	1502.3
Accts Payable	241.7	295.2	255.3
Debt Due	24.5	77.4	128.2
Other	952.5	833.6	860.2
Current Liab.	1218.7	1206.2	1243.7

ANNUAL RATES of change (per sh)	Past 10 Yrs.	Past 5 Yrs.	Est'd '95-'97 to '01-'03
Sales	7.0%	9.5%	*8.5%*
"Cash Flow"	9.5%	18.5%	*8.5%*
Earnings	5.5%	9.5%	*12.5%*
Dividends	5.5%	3.5%	*7.5%*
Book Value	4.5%	5.5%	*11.5%*

Figure 6.2. Value Line Analysis Chart



Coca-Cola's earnings moved up sharply again in first half of 1997, although sales actually fell. The decline in the top line was the result of the sale in 1996 of previously consolidated bottling operations in France, Belgium, and east Germany and a stronger U.S. dollar. Worldwide gallon shipments of concentrates were up 8% for the six months, and there were selective price increases. Profit margins improved as concentrate sales accounted for a larger portion of the business, and there were sizable gains ($0.16 a share after taxes) from the sale of bottlers in the United Kingdom and the Philippines. (Coca-Cola has a long-term strategy of taking equity positions in bottlers that need capital and then sometime later usually selling those positions when a bottler gets stronger; since this is done on a regular basis, the company considers any gains to be part of normal operating income, and we have treated it the same way.) With fewer shares outstanding, share earnings were up *31%*.

Revenues and profit growth should be strong for the rest of this year and in 1998, although the increase next year will probably be somewhat less than in this year since capital gains are likely to be smaller. In the U.S., the core brands are all doing well, and we expect that to continue. Two new products, *Surge* and *Citra* look promising, and *Barq's*, *Powerade*, *Fruitopia*, and *Nestea* should have higher sales. Rapid growth is expected again overseas, where Coke is the dominant soft drink brand in most markets. Demand has been increasing particularly fast in East Central Europe, China, India, and, recently, the Middle East.

The company's goal is to increase profits 15%-20% a year, and we think it will be successful in doing that in the coming 3 to 5 years. Worldwide demand for soft drinks will continue to grow, and Coke has the infrastructure, financial strength, and marketing skills to take advantage of it.

Coke shares continue to be ranked to outperform the market in the coming six to 12 months, but because the price has risen so much and the price/earnings ratio is so high, we look for only modest appreciation, at best, out 3 to 5 years.

Stephen Sanborn, CFA *August 15, 1997*

(A) Includes Columbia Pictures: 7/82-12/86. (B) Based on average shares outstanding. Next earnings report due late Oct. Excludes special gains: '81, 2¢; '86, 8¢; disc. op. gains (loss): '83, (1¢); '85, 2¢; '89, 2¢; nonrec. gain (loss): '89, 36¢; '92, (8¢). (C) Next div'd meeting about Oct. 16. Goes ex Sept. 11. Div'd payment dates: April 1, July 1, Oct. 1, Dec. 15. ■ Div'd reinvestment plan avail. (D) Incl. intangibles. In '96: $753.0 mill., 30¢/sh. (E) In millions, adj. for stock splits.

1. **Here is the core of Value Line's advice—the rank for Timeliness; the rank for Safety; Beta—the stock's sensitivity to fluctuations of the market as a whole.**

2. **The projected average annual return**— based on estimated 3- to 5-year price appreciation plus dividend income.

3. **The record of insider decisions**—decisions by officers and directors to buy or sell as reported to the SEC one month or more after execution.

4. A record of **the decisions taken by the biggest institutions** (over $28 billion in equity holdings)—including banks, insurance companies, mutual funds—to buy or sell during the past three quarters and the total number of shares bought or sold.

5. **The capital structure** as of recent date showing the percentage of capital in long-term debt (13%) and in common stock (87%); the number of times that total interest charges were earned (17 as of August 1997).

6. **Current position**—current assets and current liabilities, the components of working capital.

7. **Annual rates of change** (on a per-share basis). Actual past, estimated future.

8. **Quarterly earnings** are shown on a per-share basis (estimates in bold type), quarterly sales on a gross basis.

9. **Quarterly dividends paid** are actual payments. The total of dividends paid in four quarters may not equal the figure shown in the annual series on dividends declared. (Sometimes a dividend declared at the end of the year will be paid in the first quarter of the following year).

10. **Footnotes** explain a number of things, such as the way earnings are reported, wether "fully diluted", on a "primary" basis, or on an "average shares outstanding" basis.

11. The stock's **highest and lowest** price of the year.

12. **The Value Line**—reported earnings plus depreciation ("cash flow") multiplied by a number selected to correlate the stock's 3- to 5-year projected target price with "cash flow" projected out to 1997-98.

13. **Monthly price ranges** of the stock—plotted on a ratio (logarithmic) grid to show percentage changes in true proportion. For example, a ratio chart equalizes the move of a $10 stock that rises to $11 with that of a $100 stock that rises to $110. Both have advanced 10% and over the same space on a ratio grid.

14. **Recent price**—nine days prior to delivery date.

15. **P/E ratio**—the most recent price divided by the latest six months' earnings per share plus earnings estimated for the next six months.

16. **P\E median**—a rounded average of four middle values of the range of average annual price/earnings ratios over the past 10 years.

17. **Relative P/E ratio**—the stock's current P/E divided by the median P/E for all stocks under Value Line review.

18. **Dividend yield**—cash dividends estimated to be declared in the next 12 months divided by the recent price.

19. **Options patch**—indicates listed options are available on the stock and on what exchange they are most actively traded.

20. **The 3- to 5-year target price range,** estimated. The range is placed in proper position on the price chart and is shown numerically in the "2000-02 Projections" box on the left side of the price chart.

21. **Relative price strength** describes the stock's past price performance relative to the Value Line Composite Average of 1,700 stocks. The Timeliness rank usually predicts the future direction of this line.

22. **The number of shares traded monthly** as a percentage of the total outstanding.

23. **Statistical milestones** that reveal significant long-term trends. The statistics are presented in two ways: 1) the upper series records results on a per-share basis; 2) the lower records results on a gross basis. Note that the statistics for the current year are estimated, as are the figures for the average of the years 2000-2002. The estimate would be revised, if necessary, should future evidence require. The weekly *Summary & Index* would promptly call attention to such revisions.

24. A condensed summary of the **business,** significant shareholders, and the company's address and telephone number.

25. A 400-word **report on recent developments and prospects**—issued once every three months on a preset schedule.

26. **The date of delivery** to the subscribers. The survey is mailed on a schedule that aims for delivery to every subscriber on Friday afternoon.

27. Value Line's Indexes of **Financial Strength, Price Stability, Price Growth Persistence, and Earnings Predictability.**