CHAPTER 11
The Financial Anatomy of a Company—Fundamental Analysis

Introduction

The two most common approaches to evaluating and selecting stocks are fundamental analysis and technical analysis. The goal of fundamental analysis is to determine a stock's equilibrium price or intrinsic value. Fundamentalists (those practicing fundamental analysis) hope to profit by purchasing stocks they estimate to be underpriced (whose market price is below the equilibrium value they have determined) and selling or shorting stocks they determine to be overpriced. Thus, the real objective of the fundamentalist is to earn abnormal returns by being able to identify mispriced securities. Technical analysis, on the

other hand, involves studying trends in security prices. Technicians search for patterns such as a stock trading low on one day of the week and high on another, a stock that increases only after another security has increased, or a stock whose price decreases after it trades away from an average level. As we will discuss in Chapter 14, technical analysis uses measures such as moving averages or confidence indexes and theories such as the Dow theory or the theory of contrary opinion. In this chapter, we focus on fundamental analysis. We begin by examining the anatomy of a company and the fundamental factors that determine the value of a company and its equity. In Chapter 12, we extend our examination of fundamental analysis by looking at different quantitative approaches that are used to estimate the intrinsic value of security. Finally, in Chapter 13, we look at aggregate economic and industry factors and look at the valuation of the overall market and industries.

Stock Value

As we discussed in Chapter 3, the value of a stock is the present value of its future dividends. Thus, the stock value of a company expected to last *N* periods can be expressed as:

$$V_0^S = \sum_{t=1}^{N} \frac{d_t}{(1+k_e)^t} = \frac{d_1}{(1+k_e)^1} + \frac{d_2}{(1+k_e)^2} + \cdots + \frac{d_N}{(1+k_e)^N}$$

where:

- d_t = dividend per share (DPS) in period t
- k_e = required rate

If dividends were expected to grow at a constant rate, g, over the entire life (N) of the stock, then the value of the stock would be:

$$V_0^S = \sum_{t=1}^{N} \frac{d_0(1+g)^t}{(1+k_e)^t} = \frac{d_0(1+g)^1}{(1+k_e)^1} + \frac{d_0(1+g)^2}{(1+k_e)^2} + \cdots + \frac{d_0(1+g)^N}{(1+k_e)^N}$$

Many companies have an indefinite life, with many expected to last many years. As shown in Chapter 3, as N gets large, the valuation equation approaches a maximum value equal to $d_1/(k_e - g)$ at a discrete N value such as 30 to 50 years (see Exhibit 3.4 in Chapter 3 for the proof). Thus, for a company expected to have a constant growth rate in dividends for the next 40 to 50 years—a profile that describes many large companies—the value of its stock would be:

$$V_0^S = \sum_{t=1}^{N} \frac{d_0(1+g)^t}{(1+k_e)^t} = \frac{d_0(1+g)^1}{k_e - g} = \frac{d_1}{k_e - g} \quad \text{for large } N$$

Thus, investors requiring a 10 percent rate on a stock currently paying a $5 dividend and expected to grow at an annual rate of 3 percent for a long time would value the stock at $73.57:

$$V_0^S = \frac{d_0(1+g)^1}{k_e - g} = \frac{d_1}{k_e - g} = \frac{\$5(1.03)}{0.10 - 0.03} = \$73.57$$

Note that the value of the stock would still be $73.57 even if an investor planned to sell it at a future horizon date, provided that the expected selling price at the investor's horizon is equal to the present value of the stock's future dividends. For example, if an investor's horizon were three years, then dividends in year four would be $5.63 [= $5(1.03)^4] and the value of the stock at year three would be $80.39. Discounting this value and the dividends back to the present yields a current value of the stock of $73.57:

$$V_0^S = \frac{d_0(1+g)^1}{(1+k_e)^1} + \frac{d_0(1+g)^2}{(1+k_e)^2} + \frac{d_0(1+g)^3 + V_3^e}{(1+k_e)^3}$$

$$V_0^S = \frac{\$5(1.03)}{1.10} + \frac{\$5(1.03)^2}{(1.10)^2} + \frac{\$5(1.03)^3 + \$80.39}{(1.10)^3} = \$73.57$$

where:

$$V_3^S = \frac{d_4}{k_e - g} = \frac{d_0(1+g)^4}{k_e - g} = \frac{\$5(1.03)^4}{0.10 - 0.03} = \frac{\$5.63}{0.10 - 0.03} = \$80.39$$

As discussed in Chapter 3, companies and industries may be in different stages of industrial development and as a result have different growth rates over time instead of a constant growth rate. For example, a company could be characterized by a three-stage growth process where it is expected to have an extraordinary growth rate of g_1, a transitional period in which the growth rate moves from the extraordinary rate to the steady-state rate, and then to a steady-state period in which the stock dividend grows at the steady-state rate. In terms of the above example, suppose investors expect the dividends to initially grow at an annual rate of 6 percent for three years, then steadily decline with growth rates of 5 percent, 4 percent, and 3 percent in years four, five, and six, respectively, and in year six to grow at a constant steady-state rate of 3 percent. Given these assumptions, the investor would value the stock at $81.66:

$$V_0^S = \frac{d_0(1+g_1)^1}{(1+k_e)^1} + \frac{d_0(1+g_1)^2}{(1+k_e)^2} + \frac{d_0(1+g_1)^3}{(1+k_e)^3} + \frac{d_0(1+g_1)^3(1+g_2)}{(1+k_e)^4}$$
$$+ \frac{d_0(1+g_1)^3(1+g_2)(1+g_3)}{(1+k_e)^5} + \frac{d_0(1+g_1)^3(1+g_2)(1+g_3)(1+g_4)}{(1+k_e)^6}$$
$$+ \frac{\dfrac{d_0(1+g_1)^3(1+g_2)(1+g_3)(1+g_4)(1+g_4)}{k_e - g_4}}{(1+k_e)^6}$$

$$V_0^S = \frac{\$5(1.06)^1}{(1.10)^1} + \frac{\$5(1.06)^2}{(1.10)^2} + \frac{\$5(1.06)^3}{(1.10)^3} + \frac{\$5(1.06)^3(1.05)}{(1.10)^4}$$
$$+ \frac{\$5(1.06)^3(1.05)(1.04)}{(1.10)^5} + \frac{\$5(1.06)^3(1.05)(1.04)(1.03)}{(1.10)^6}$$
$$+ \frac{\dfrac{\$5(1.06)^3(1.05)(1.04)(1.03)(1.03)}{0.10 - 0.03}}{(1.10)^6} = \$81.66$$

$$V_0^S = \frac{\$5.30}{(1.10)^1} + \frac{\$5.62}{(1.10)^2} + \frac{\$5.96}{(1.10)^3} + \frac{\$6.25}{(1.10)^4}$$
$$+ \frac{\$6.50}{(1.10)^5} + \frac{\$6.70}{(1.10)^6} + \frac{98.56}{(1.10)^6} = \$81.66$$

In practice, estimating a stock's future dividend growth is very challenging, requiring knowledge of the company's operations, the external factors that affect the company, and the company's investment opportunities. The two most important factors influencing the equity value of a company, however, are its potential earnings from current operations and its potential investments. To see how these two factors

affect value, we first need to examine how a company's operations and investment decisions determine its dividends and dividend growth rates. We start with the simple case of a company that does not make any corporate investments and is expected to last a long time.

Equity Valuation of a Firm

Consider the case of an investor who is planning to buy stock in the Zuber Oil Company. Zuber is a small company that owns and operates a producing crude oil well. The company has five million shares of stock outstanding (*n*), long-term debt of $250 million in which it pays 8 percent interest (*Int*) each year, no short-term debt or cash position, no depreciation or depletion allowances, and an effective corporate tax rate (*t*) of 40 percent. Suppose after studying geological reports, long-term forecasts of crude oil price trends, and the cost of operating oil wells, the investor estimates that Zuber's oil well reserves will produce a constant annual output of 1.8 million barrels for a long rime—the next 100 years—that the price of crude oil will average $100/barrel, and that the annual operating cost (*TOC*) of the well will be $60 million.[1] Based on these estimates, the investor determines that Zuber's expected total revenue (*TR*) will be $180 million per year and the company's annual earnings before interest and taxes (*EBIT*) will be $120 million (see Exhibit 11.1):

$$E(EBIT) = E(TR) - E(TOC)$$
$$E(EBIT) = \$180 \text{ million} - \$60 \text{ million} = \$120 \text{ million}$$

Total Revenue (TR)	$180 million
– Total Operating Cost (TOC)	$60 million
= Earnings Before Interest and Taxes (EBIT)	$120 million
– Interest (Int = (.08)($250 million) = $20 million	$20 million
= Earnings Before Taxes (EBT)	$100 million
– Taxes (T) (Effective Corporate Tax Rate = *t* = 40%)	$40 million
= Earnings After Taxes (EAT)	$60 million
– Retained Earnings (RE)	0
= Total Dividends (D)	$60 million
÷ Number of Shares (n)	5 million
= Dividends per Share (d)	$12

EXHIBIT 11.1 Zuber Oil Company Expected Annual Income Statement

With long-term debt of $250 million and an interest rate on the debt, k_d, of 8 percent, Zuber will pay $20 million in interest each year, which under federal corporate tax laws is deductible. The investor therefore estimates that Zuber's expected earnings before taxes (*EBT*) will be $100 million, its tax liability (*T*) will be $40 million, and its expected earnings after taxes (*EAT*) will be $60 million:

$$E(EBT) = E(EBIT) - Int$$
$$E(EBIT) = \$120 \text{ million} - \$20 \text{ million} = \$100 \text{ million}$$
$$E(EAT) = E(EBT) - T = E(EBT) - E(EBT)t$$
$$E(EAT) = \$100 \text{ million}(1 - 0.4) = \$60 \text{ million}$$

Finally, suppose that the investor does not expect Zuber to make any corporate investments in the future; that is, Zuber is a no-growth company. As a result, the investor would expect Zuber's retained earnings (*RE*) to be zero (since the company plans no investments) and its expected annual total dividend (*D*) each year to be equal to its earnings of $60 million:

$$E(D) = E(EAT) - RE$$
$$E(D) = \$60 \text{ million} - 0 = \$60 \text{ million}$$

With 5 million shares, the investor would expect Zuber's dividend per share (*d* or *DPS*) to be $12.00:

$$E(d) = \frac{E(D)}{n} = \frac{\$60 \text{ million}}{5 \text{ million}} = \$12$$

In summary:

$$E(d) = \frac{[E(EBIT) - Int)](1 - t) - RE}{n}$$

$$E(d) = \frac{[120 \text{ million} - \$20 \text{ million}](1 - 0.4) - 0}{5 \text{ million}} = \frac{\$60 \text{ million}}{5 \text{ million}} = \$12$$

Note, in this and subsequent chapters dealing with fundamental stock valuation, we will adopt the nomenclature often used in finance of denoting firm values with upper case symbols and per share values with lower case symbols.

Since the oil well is expected to produce at a constant rate of 1.8 million barrels per year for 100 years, and the investor does not expect the company to make any future investments, the value of Zuber's stock can be determined by using the constant growth rate model, with an assumed growth rate in dividends (g) of zero:

$$\textit{Total Equity Value: } V_0^E = \frac{E(D_1)}{k_e}$$

$$\textit{Per Share Value: } V_0^e = \frac{E(d_1)}{k_e}$$

The investor's required return can be determined by using an equilibrium model such as the CAPM or APT described in Chapter 9 and Chapter 10. In this case, suppose the investor determines her required return based on the CAPM, estimating the beta of Zuber to be two, the risk-free rate to be 4 percent, and the market risk premium ($E(R^M - R_f)$) to be 10 percent. Thus, using the CAPM, her required return would be 24 percent:

$$k_e = R_f + [E(R^M) - R_f]\beta$$
$$k_e = 0.04 + [0.14 - 0.04](2) = 0.24$$

Given a 24 percent required return, the investor would therefore value Zuber stock to be worth $50 per share:

$$V_0^e = \frac{E(d_1)}{k_e}$$
$$V_0^e = \frac{\$12}{0.24} = \$50$$

Thus, if the investor were able to buy the stock at $50, then based on her projected *DPS* of $12.00, her expected return would be 24 percent [$E(R^E)$ = $12.00/$50], which would equal her required return:

$$E(R^E) = \frac{E(d_1)}{V_0^e}$$
$$E(R^E) = \frac{\$12}{\$50} = 0.24$$

The investor, of course, would hope that Zuber were priced below $50— underpriced—yielding her an expected return exceeding her required return.

Note that with 5 million shares outstanding, the investor would value Zuber's total equity, V_0^E, at $250 million:

$$V_0^E = \frac{E(D_1)}{k_e} = \frac{\$60 \text{ million}}{0.24} = \$250 \text{ million}$$

$$V_0^E = V_0^e n = (\$50)(5 \text{ million}) = \$250 \text{ million}$$

Value of Assets

The value of a firm's asset, V^A (i.e., the value of the firm) is equal to the value of its equity plus the value of its debt, V^D. With a debt of $250 million, the total value of Zuber's would be $500 million:

$$V_0^A = V_0^E + V_0^D$$

$$V_0^A = \$250 \text{ million} + \$250 \text{ million} = \$500 \text{ million}$$

Recall, from corporate finance, the *value of the asset* can also be calculated by discounting the expected earnings that flow to both shareholders, $E(EAT)$, and creditors, Int, at the investor's *weighted average cost of capital*, k_C:

$$V_0^A = \frac{E(EAT) + Int}{k_C}$$

where:

- $k_C = f_E k_e + f_D k_d$
- f_E = the proportion of the firm financed by equity (V_E/V_A)
- f_D = the proportion financed by debt (V_E/V_A)

If the equity-to-asset and debt-to-asset ratios reflect the ex-ante equity values of $250 million and debt of $250 million, then f_E would be 0.5 [= (V_E/V_A) = $250 million/$500 million] and f_D would be 0.5 [= (V_D/V_A) = $250 million/$500 million]. Given the cost of debt, k_d, equals the interest rate of 8 percent,

then with a firm financed with half debt and half equity, the overall cost of capital would be 16 percent and the total value would be $500 million, matching the sum of the value of equity and the value of debt:

$$k_C = f_E k_e + f_D k_d$$
$$k_C = (0.5)(0.24) + (0.5)(0.08) = 0.16$$

$$V_0^A = \frac{E(EAT) + Int}{k_C}$$

$$V_0^A = \frac{\$60 \text{ million} + \$20 \text{ million}}{0.16} = \$500 \text{ million}$$

Thus, if Zuber can generate $80 million per year—a 16 percent return from a total asset valued at $500 million—it would be able to take care of equity investors who are financing half the firm (the oil well) and require a 24 percent return, that is, (0.24)(0.5)($500 million) = $60 million, and take care of creditors who are financing half the asset and require an 8 percent return, that is, (0.08)(0.5)($500 million) = $20 million.

It should be noted that the $80 million of earnings flowing to investors takes into account the interest tax deduction benefits of the debt. If the total asset value is calculated based on the net *EBIT* of $72 million [= ($120 million) (1 – 0.4)], then the earnings flowing to investors would be underestimated by $8 million. To correct for this in valuing the asset, the cost of capital for debt needs to be calculated net of taxes [$k_d(1 - t)$]:

BLOOMBERG WACC SCREEN

The Bloomberg WACC screen calculates the WACC for a loaded stock. The cost of equity is determined by the CAPM model, and the cost of debt is determined by the after-tax rate on debt, with the rate on debt adjusted to reflect the company's quality ratings. You can click the Equity, Debt Cost, and Preferred Equity tabs to bring up screens showing calculations.

See Bloomberg Web Exhibit 11.1.

Comparative Analysis

If all investors formulate the same expectations about the Zuber Oil Company as our investor did, then the equilibrium market price of Zuber would be $50. The market share price of Zuber would change if investors change their expectations about dividends or the required return by investors. For example, if new geological estimates indicated greater crude oil reserves or new information on oil demand indicated higher prices than the expected price of $100/barrel, then investors would expect Zuber's earnings and

dividends to be greater than $60 million or $12 per share and accordingly would value the stock higher. Similarly, if long-term interest rates were expected to decline with no change in the market risk premium, investors would also value the stock higher; that is, an interest rate decrease would have two impacts on the value of stock. First, it would lower the company interest payments on its debts if the company refinances, thereby increasing the company earnings and value. Second, lower interest rates would decrease investors' required return, k_e, provided the risk premium, $E(R^M) - R_f$, did not increase. For example, suppose in our above case investors expected long-term interest rates to decrease with the risk-free rate decreasing from its 4 percent level to 3 percent and with the risk premium staying at 10 percent, and furthermore they expected Zuber to refinance its 8 percent, $250 million debt at 6 percent. Based on that scenario, investors would expect Zuber's DPS to increase from $12 to $12.60 because of the lower interest expenses:

$$E(d) = \frac{[E(EBIT) - k_d V_D)](1 - t)}{n}$$

$$E(d) = \frac{[\$120 \text{ million} - (0.06)(\$250)](1 - 0.4)}{5 \text{ million}} = \frac{\$63 \text{ million}}{5 \text{ million}} = \$12.60$$

the required return to decrease from 24 percent to 23 percent:

and the value of Zuber's stock to increase by 9.57 percent from $50 to $54.78:

In general, stock prices are quite sensitive to changes in interest rate, the growth rate in the economy, and inflation. As we saw in Chapter 10, the study by Roll, Ross, and Chen provided some statistical sup-

port for the importance of macroeconomic factors in determining a stock's equilibrium return and value. Such factors can be described as exogenous to the company. That is, they are factors over which the company has no control, even though they impact the company and its stock. For stock analysts, exogenous factors are market factors—factors that affect all stocks; the analyst's job is to determine the impact such factors have on the stock's value. In contrast, factors that the company has control over are referred to as endogenous. Two important endogenous factors affecting the value of a company's stock are its capital structure decisions related to how much its assets are financed with debt and how much with equity (that is, the company's debt-to-equity ratio), and the investments the company makes or is expected to make in the future.

BLOOMBERG FA SCREEN, IS TAB

Company income statements can be found on Bloomberg's FA screen, IS tab. You can use the graph icon to see multiple items graphically.

BLOOMBERG EEO SCREEN

The Bloomberg EEO screen provides current and estimated growth rates for EPS and DPS. The estimates are provided by broker/contributors. As such, they represent the consensus estimate of the market. You can select forecast based on standard consensus, contributor estimates that have been weighted based on past accuracy, estimates that factor in the last month's adjustments, and the like. See the screen's "Help" page for more information on forecast.

BLOOMBERG EEB SCREEN:

The Bloomberg EEB shows projections of earnings, sales, and other income statement items from a consensus of Bloomberg contributors. You can view how the consensus has changed over time and the estimates of individual contributors.

OTHER BLOOMBERG EARNINGS SCREENS:

- **ERN**: Earnings History.
- **EE**: Earnings and Estimates.
- **EM**: Earnings Trends.
- **EE SURP**: Earnings Surprises.
- **EE Z**: Zach's Earnings Estimates.

See Bloomberg Web Exhibit 11.2.

Capital Structure

The amount of debt a company has relative to its equity is often determined by the way in which it finances its investments over time. A company with a propensity to finance its investment projects with debt would in time have a higher debt-to-equity ratio than a company that tends to finance its investment by selling new stock or by retaining its earnings. Sometimes, however, changes in a company's capital structure occur as a result of a merger. Many companies are acquired by private equity or leverage buyout companies or other corporations that financed the acquisition by issuing bonds. In many of those cases, the major difference between the old company and the new one is that the later company just had more debt. Finally, some companies change their capital structure as part of a corporate policy. A company such as the Zuber Company that we assumed did not make any corporate investments might decide that it wants a higher debt-to-equity ratio than its current ratio of one in order to take advantage of tax laws (discussed below). To realize this, the company could borrow funds to finance the purchase of some of its stock. Alternatively, if the company wanted to lower its debt-to-equity ratio, it could do so by selling new stock and using the proceeds to retire some of its debt.

EXHIBIT 11.2 SML and Hamada Relation

Whether a company's capital structure changes by the way in which it finances its investments, by a corporate merger, or through a change in corporate policy, any change in the company's debt-to-equity ratio will have an impact on the value of the company's stock. Generally, changes in capital structure influence stock prices by altering the company's risk exposure on its equity and by changing the stock's expected earnings-per-share.

Capital Structure, Risk, and Stock Price

If the interest payments on debt are fixed, then a change in capital structure will lead to changes in the risk that equity investors are assuming. This change in risk exposure is due to the debt's contractual obligation in which the corporation is required to pay creditors interest and principal regardless of the earnings of the company. Companies with high debt-to-equity ratios find that they are able to provide their shareholders with more earnings per share (*EPS*) in good economic states when their earnings before interest and taxes are high and their payments to creditors are fixed, but less *EPS* in poor economic states when *EBIT* are low and yet the fixed interest must still be paid. Thus, the larger a company's debt-to-equity ratio, the greater its fluctuations in *EPS* and the greater the fluctuations in the return on equity to investors. The increased fluctuations in the returns on equity resulting from an increase in a company's debt-to-equity ratio, also serves to increase the stock's beta; that is, an increase in the debt-to-equity ratio increases the stock's fluctuations relative to the market's fluctuations. In a 1969 seminal article in the *Journal of Finance*, Robert Hamada derived an equation showing this positive relationship between a stock's beta and its debt-to-equity ratio. The Hamada equation is derived in many corporate finance texts. The equation is

where:

- β_L = levered beta; beta of a company with debt
- β_u = unlevered beta; beta of the company if it has no debt
- t = corporate tax rate
- φ = debt-to-equity ratio

Recall that according to the CAPM, the greater a stock's beta, the greater its required return, k_e. Thus, a company that increases its debt-to-equity ratio, φ, will find both the beta of its stock and the rate of return required by investors to be greater. All other things equal, an increase in leverage will cause an increase in the required return causing the stock to decrease. The direct relation between φ and k_e is depicted graphically in Exhibit 11.2. The upper quadrant of the figure in the exhibit shows the relation between k_e and β as defined by the security market line (SML) with a risk-free rate of 4 percent and a market risk premium of 10 percent, and the lower quadrant shows the Hamada relationship between φ and β as defined by the Hamada equation for a company with an unlevered beta of one and an effective corporate tax rate of 40 percent. Thus, if the company were unlevered ($\beta_u = 1$), then its required return would be 14 percent; if it changed its debt-to-equity ratio to $\varphi = 1$, then its beta would increase to 1.6 and its required return would increase to 20 percent.

Capital Structure, EPS, and Stock Price

In addition to changing a stock's risk, changes in capital structure also can change shareholders' expected *EPS*. For U.S. companies, the change in *EPS* resulting from a change in capital structure is due to corporate tax laws. Specifically, federal tax codes allow corporations to deduct the interest they pay on debt before determining the earnings that are taxable. Thus, with interest being tax deductible and dividends not, companies with greater debt-to-equity ratios, will, with other factors equal, have more of their earnings going to investors (creditors and shareholders) and less to the government. This can be seen in Exhibit 11.3 where the income statements are shown for the Zuber Company for the case in which the company has zero debt and one where it has $250 million in debt. In the no-debt case, Zuber provides its investors (shareholders) with $72 million, whereas in the leverage case, investors receive a total of $80 million ($20 million to creditors and $60 million to shareholders).

Items	Zuber Company with no debt	Zuber Company with $250 million debt, paying 8% interest
E(*EBIT*)	$120 million	$120 million
– Interest	0	$20 million
= *E*(*EBT*)	$120 million	$100 million
– Taxes (*t* =0.04)	$48 million	$40 million
= *E*(*EAT*)	$72 million	$60 million
Earnings to Investors: *E*(*EAT*) + Interest	$72 million + 0 = $72 million	$60 million + $20 million = $80 million

EXHIBIT 11.3 Zuber Earnings Given Different Debt Levels

The law allowing interest to be tax deductible suggests that it makes a difference whether a company calls its investors either shareholders or creditors. Many of the leverage buyout companies (LBOs) that emerged in the 1980s to acquire corporations were formed to take advantage of this tax law. These LBOs would issue lower quality, high-yielding junk bonds to finance their corporate acquisition. After the acquisition, the resulting company was more highly leveraged, often with a greater proportion of its in-

vestors now being creditors. With interest tax deductible, however, the newly structured company was able to pay less in corporate taxes, enabling it to pay the higher interest to creditors, as well as leaving the company with the ability to earn a greater *EPS* for its stockholders. Thus, an increase in the debt-to-equity ratio, often leads to a greater expected *EPS*, and with all other factors constant, an increase in the value of the company's stock.

It should be noted that a change in capital structure can also change the number of shares outstanding. If a company increases its debt-to-equity ratio by borrowing funds and buying up shares, then the number of shares would decrease, and if the company lowers the ratio by selling new stock in order to retire some of its debt, then the number of shares would increase.

In summary, a change in capital structure has two opposite effects on a company's stock. On the one hand, when there is an increase (decrease) in the debt-to-equity ratio, the stock's risk increases (decreases), causing the required return to increase (decrease) and the price of the stock to decrease (increase). On the other hand, because of the interest tax deduction and the change in the number of shares, an increase (decrease) in the debt-to-equity ratio increases (decreases) *EPS*, causing the stock price to increase (decrease). If this latter effect of an increase in *EPS* dominates the first effect of an increase in risk and required return, then the price of the stock would increase; if the first effect of an increase in risk and required return dominates the *EPS* effect, then the stock price would decrease.

BLOOMBERG FA SCREEN: FA LEV

The Bloomberg FA screen can be used to analyze a company's capital structure. On FA, click "Ratios" and "Credit" tabs to bring up leverage ratios. You can also bring up the screen by entering FA LEV.

See Bloomberg Web Exhibit 11.3.

Corporate Investments

A U.S. food-processing company expanding its markets to Europe, a multinational electric company developing a new technology, a pharmaceutical company developing and marketing a new drug, or an oil company drilling for new wells are all examples of investments that corporations undertake each year. For many analysts, a corporation's current and future investments are the most important factors to consider in determining the company's value.

Case 1: Zuber Oil Company

To most large corporations, investments are an ongoing activity. To see the impact of investments on a stock's value, however, let us start with a simple case in which our illustrative Zuber Oil Company is expected to make a one-time-only investment. To simplify our analysis, assume that Zuber has no debt (an all-equity or unleveraged company) and is expected to generate annual *EAT* from its oil well of $60 million. The *EAT* of $60 million can be viewed as the company's earnings from its existing assets (in this case the producing oil well). Also, assume Zuber's beta is again two, the risk-free rate is 4 percent, and the market risk premium is 10 percent, yielding a required return of 24 percent:

Given our assumption that Zuber's oil well is expected to last a long time, the total equity value of Zuber, as well as asset value (since it is an all-equity company), would be $250 million, and given five million shares, its *EPS* would be $12 and its share price would be $50:

To illustrate the impact that corporate investments have on a stock's value, suppose Zuber announced that in year one it will make a one-time-only investment (I) of $60 million by purchasing a new oil well (I_1 = $60 million). After evaluating the investment, suppose that security analysts, as well as Zuber management, estimate that the investment will generate an annual investment rate of return (i) of 24 percent (i = 0.24), that the risk of the investment project, as measured by its beta, β_p, would be two ($\beta_p = 2$) —the same risk as the existing asset—and like the current oil well, the new one is expected to have a very long life. Note, that with a beta of two, the investment would have a required return equal to Zuber's preinvestment required return of 24 percent, implying that the investment would not change the risk or required return of the company; also note that the investment return is equal to the required return: i =

k_e = 0.24. Exhibit 11.4 summarizes the information on the Zuber Oil Company and its investment expenditure.

	Assumptions
1.	All Equity Company
2.	*EAT* = Earnings from Existing Asset $60 million
3.	Beta of Existing Asset $\beta = 2$
4.	Number of Shares $n = 5$ million
5.	SML: $k_e = 0.04 + [0.10]\beta = 0.24$
6.	Investment Expenditure in Year 1: $I_1 = \$60$ million
7.	Expected Return on Investment: $i = 0.24$
8.	Beta of Investment: $\beta_p = 2$

Assumptions

9. Required Return on Investment:
   $k_e^p = 0.24$

EXHIBIT 11.4 Zuber Company's Earnings and Investment Case

The impact of the investment on the company can be analyzed by determining its impact on either the equity value of the company or its share price. The total equity value can be measured in terms of the present value of the cash flows that go to existing shareholders. Since there is only one investment, the current equity value can be defined in terms of the cash flow over two years, with the cash flow in the second year being the dividends received by *existing* shareholders and the estimated stock value (V_2^E):

Before we can estimate the impact of Zuber's proposed investments on its current equity value, we need to know how the firm plans to finance the investment. That is, every investment decision has a related financing decision. In this context, the *financing decision* facing the firm is one of whether they should finance the investment internally through retained earnings (i.e., existing shareholders financing the investment by giving up their dividends) or externally by selling new stock or borrowing.

Suppose that investors expect Zuber to finance internally. To do this, Zuber would have to retain $60 million in earnings in year one to finance the investment expenditure. Since the estimated earnings from its existing assets are just $60 million, dividends to shareholders in the first year would be zero under an internal financing case:

In year two, shareholders would expect to receive dividends totaling $74.4 million. This would include $60 million from the existing asset (old oil well) and 14.4 million [$(i)(I_1)$ = (0.24)($60 million) = $14.4 million] from the new asset (new oil well):

Since both oil wells (current and proposed) are expected to last a long time, the total equity value in year 2 would be equal to the value of perpetuity, paying an annual dividend of $74.4 million. With both assets having a beta of two, the required return by investors would still be 0.24; thus the total equity value of Zuber in year two would be $310 million:

Discounting each year's cash flows by k_e = 0.24, the current value of equity is $250 million:

Recall that the value of Zuber's equity without the investment was also $250 million. Thus, the investment financed internally has no impact on the equity value of the company. Note that we can also reach the same conclusion if we value Zuber on a per share basis. That is, dividing each cash flow by the number of shares (n = 5 million), we end up with the price per share of $50—the same per share price of Zuber's stock without the investment:

Suppose Zuber is expected to finance its $60 million new oil well investment in year one externally. Zuber could externally finance the project by selling new shares or borrowing (issuing bonds or borrowing from a financial institution), or some combination of the two. If Zuber borrows, then the stock value could be affected by not only the investment, but also by the change in capital structure. To isolate just the investment impact, let us assume that, since Zuber is an all-equity firm, it decides to finance its in-

vestment by selling new stock. If Zuber can sell new shares in year one at the current price of $50, it would need to sell 1.2 million new shares (n_N) in order to raise the requisite $60 million:

The total value of equity to *existing* shareholders under this external financing case would be equal to the present value of the total dividends of $60 million that existing shareholders receive in year one and the present value of the existing shareholder's claim on the cash flows in year two. After the sale of 1.2 million new shares in year one, the total number of shares outstanding in year two would be 6.2 million shares. As a result, existing shareholders would have an 80.645 percent claim (= 5 million/6.2 million) on the estimated $74.4 million dividends and $310 million equity value expected to occur in year two. Discounting these cash flow claims by 24 percent yields a current equity value to existing shareholders of $250 million—the same as the internal financing case and the no investment case:

Finally, dividing the cash flow in each year by the number of shares (n = 5 million in year 1 and $n + n_N$ = 6.2 million in year 2), we obtain the dividend per share of $12 in both years 1 and 2 and a value per share in year 2 of $50. Discounting those values by 24 percent, we obtain a current value per share of $50:

Inferences from the Case

Two important inferences can be drawn from the above case. First, the equity value of Zuber is $250 million under both the internal and external financing cases. This suggests that the choice of financing (internal or external) is irrelevant.[2] The irrelevance in the choice of financing is due to offsetting tradeoffs between the two types of financing. With internal financing, shareholders give up early earnings in return for greater earnings in the future with no dilution in the value of their claims; with external financing, shareholders receive early earnings but give up part of the total amount of future earnings, allowing for dilution. Since these two tradeoffs exactly offset each other, there is no gain in value by financing either internally or externally.

It should be noted that the argument for the irrelevance of financing (sometimes referred to as dividend policy) is based on purely financial grounds. Arguments for one form of financing over another can be made, however, for nonfinancial reasons. For example, in order to avoid sending the wrong signals to the market or to change the cash flows it normally provides to its shareholders, a company as a matter of policy may pay a constant dividend each period, often deciding to finance its investments externally in-

stead of through retaining earnings to achieve this goal. In contrast, an argument for internal financing could be made based on tax considerations. Given that the tax rate on capital gains is less than income, a company that provides its shareholders with more of a return in the form of capital gains could be more valuable than one that provides more of its return in the form of dividends. That is, if the markets are inefficient in the sense that such differences in dividend and capital gain returns are not reflected in security prices, then investors who hold stocks that generate more return in the form of capital gains would obtain higher after-tax returns than investors who received more of their returns in the form of dividends. This can be seen by examining the per share value of Zuber for both internal and external financing cases. If the market price of Zuber stock were $50 in both cases, then an investor purchasing the stock would expect to receive an annual before-tax rate of return of 24 percent. However, in the internal case, the 24 percent return would consist of a $14.88 dividend and a capital gain of $12 (= $62 – $50) in year 2, whereas in the external case, the 24 percent return would consist exclusively of the $12 in dividends received in years one and two:

With the capital gains tax rate less than the personal, the internal financing case would therefore yield a greater after-tax rate of return than the external case (assuming the stock sells for $50 in both cases). Thus, for tax reasons an argument could be made that in an effort to take care of their shareholders, corporations should finance their investments internally; this argument is often referred to as the *clientele effect*.

The second inference to be drawn from the above case is that Zuber's investment did not change the equity value. That is, the company was valued at $250 million with or without the investment:

Without investment:

With investment (internal case):

The reason for this is that Zuber is expected to obtain the same risk-adjusted rate of return from its new oil well investment that its shareholders can obtain in the market. That is, for a beta of two on the investment project, Zuber and its investors expect to obtain an investment return of i = 24 percent, which is the same rate (given our CAPM assumption) that its shareholders or any investor can obtain in the market. Recall that the method of valuing stock by discounting the stock's cash flows by the required return takes into account not only the returns from dividends and capital gains, but also the reinvestment of cash

flows at the discount rate. Thus, the $250 million value of Zuber without the investment captures the annual dividends of $60 million and also the value that shareholders have from reinvesting their dividends in the market at 24 percent for investments with a beta of two. The corporate investment case, in turn, shows management reinvesting shareholders' $60 million dividend at the same rate of 24 percent in a project with a beta of two. Since management is expected to obtain the same risk-adjusted rate that its shareholders can obtain for themselves in the market, the corporation's investment does not change the equity value of the company.

If Zuber management could obtain a risk-adjusted return on its investments that exceeded the returns that investors could obtain in the markets, then the value of Zuber's equity would be greater than $50 if investors believed that Zuber was going to pursue the investments. For example, if the new oil well was expected to generate a rate of 30 percent instead of 24 percent and the investment still had a beta of two, then the value of Zuber's equity would be $262.10 million and the share price would be $52.42:

and

It is important to note that if the market priced the stock at $54.42, then investors would realize an expected return of 24 percent given expected dividends of $15.60 and an expected year two stock price of $65. This 24 percent is the same rate investors could obtain in the market for an investment with a beta of two:

If the market priced Zuber stock above $52.42—overpriced the stock—then the expected return would be less than the 24 percent return that could be obtained in the market. In this case, an investor would obtain a risk-adjusted return less than the return obtained in the market; that is, for a beta of two, a return less than 24 percent—a bad investment to make. If the market, however, priced Zuber less than $52.42 (underpriced), then the risk-adjusted return would be above the returns obtained in the market—an abnormal return—for a beta of two, a return greater than 24 percent and a good investment to make.

In contrast, if the risk-adjusted return on Zuber's investment were less than what investors could obtain in the market, then the value of their stock would be less than $50 if investors believed that Zuber was going to undertake the investment. For example, if the investment return were expected to be only 20 percent, then the value of Zuber's equity would be $241.94 million and the share price would be $48.39:

and

If the market prices the stock at $48.39, then investors would still realize an expected return of 24 percent given the expected dividends of $14.40 and year two stock price of $60. Again, 24 percent is the same rate investors could obtain in the market for an investment with a beta of two:

If the market priced Zuber stock below $48.39—underpriced the stock—then the expected return would exceed the 24 percent expected return that could be obtained in the market. In this case, an investor could obtain a risk-adjusted return better than the return obtained in the market; that is, for a beta of two, a return greater than 24 percent, this is an abnormal return and a good investment. If the market, however, priced Zuber above $48.39 (overpriced), then the risk-adjusted return would be below the re-

turns obtained in the market; for a beta of two, this would be a return less than 24 percent and a bad investment.

It should be noted that in these cases we are assuming an investment project with the same beta as the current asset of the company. The same conclusions, however, would be reached if we evaluated Zuber undertaking an investment with a different beta.

In summary, a firm that can obtain a risk-adjusted return on its investments that exceeds the return investors can obtain in the market is referred to as a *growth firm*; a firm that earns investment returns that are less than what investors can obtain in the market is called a *declining firm*; and a firm that obtains investment returns that are equal to the returns investors can obtain in the market is referred to as a *normal firm*. In term of the CAPM, a growth company is one whose corporate investments have return (i) and risk (β_p) combinations that are above the SML; this was the case for Zuber when i = 30%. A declining company, in turn, would be one with an i and β_p combination below the SML; for Zuber, that would be when its i = 20%. Finally, a normal firm is one with the i and β_p combination on the line; in the Zuber case, it is when i = 24%. If the market prices normal, growth and declining firms that capture their abilities to earn returns equal, above, or below the market rates, then the equilibrium returns of their stocks will match their market rates.

In practice, analysts evaluate companies that they know will be making numerous investments now and into the future. The idea of a growth firm can be better defined as one in which investors view management as being capable of obtaining returns on their investments that exceed the returns investors can obtain in the market. The definitions of firms as growth, declining, and normal based on their return relative to the market return was first introduced by Robert Gordon. The valuation of the Zuber Company in terms of the Gordon-Williams model is discussed in the next section.[3]

Gordon-Williams Model

In the Zuber case, we had a company that made a one-time only investment. As a result, the company earnings grew by 24 percent from year one to year two: EAT_1 = $60 million to EAT_2 = $74.4 million [= $EAT_1 + iI_1$ = $60 million + (0.24)($60 million)]:

The 24 percent growth in earnings was equal to Zuber's investment return of i = 0.24. If Zuber's investment expenditures had been $30 million instead of $60 million—half of its earnings (I_1/EAT_1 = $30M/$60M) instead of 100 percent—then its earnings would have grown by 12 percent from year one to year two: EAT_2 = $67.2 million [= $EAT_1 + iI_1$ = $60 million + (0.24)($30 million)]:

By definition, a company's *sustainable growth rate* is equal to its return on its investments times its investment policy, where the investment policy is defined as the proportions of its investment expenditures (I) to earnings (EAT).

Thus, if Zuber were to make an investment in year one equal to 100 percent of its earnings (I_1/EAT_1 = 1) with a 24 percent rate of return on the investment, then its growth rate from year one to year two would be 24 percent [= (1)(0.24)]; if Zuber were to make an investment equal to 50 percent of its earnings (I_1/EAT_1 = 0.5), then its growth rate would be 12 percent [= (0.5) (0.24)].

The growth rate in dividends, in turn, depends on the growth rate in earnings and the dividend payout ratio (dividends/earnings). If Zuber were to finance its investments internally through retained earnings, then its investment policy (I/EAT) would be equal to retention ratio (f): the ratio of retained earnings to earnings (RE/EAT); and its dividend-payout ratio would be equal to one minus its retention ratio:

Internal Financing:

Thus, with an investment policy equal to 50 percent of earnings ($I/EAT = 0.50$), a return on investment of 24 percent ($i = 0.24$), and internal financing ($RE/EAT = f = I/EAT = 0.5$), Zuber would grow at 12 percent ($(I/EAT)(i) = fi = (0.5)(0.24) = 0.12$), and would have a dividend payout of 0.5 ($= D/EAT = 1 - f = 0.5$). Given k_e of 24 percent, Zuber would be valued at $250 million, or $50 per share, given its one-time only investment:

With the Zuber Company not expected to make any new investments after year one, the expected growth rate is zero after year two, with the company expected to generate a constant dividend of $67.2 million.

As discussed previously, the Gordon-Williams model is a constant growth model that assumes dividends grow at a constant rate for a very long time. Dividends will grow at a constant rate if a corporation's investments over time are equal to a constant proportion of the company's earnings, if the investment rate of return is the same over time, and if the dividend payout ratio is constant. Such a profile fits many well-established companies in mature industries. Suppose that Zuber was a company that was expected to make investments every year for a long time—a perpetual investment machine. Given the same investment policy of 50 percent and return on investment of 24 percent, Zuber's earnings would grow at a constant rate of 12 percent over time. In addition, if it financed its investments internally, then its dividend payout ratio would also be constant over time and its dividends would also grow at a constant rate of 12 percent. In this case, the Gordon-Williams model could be applied to determine the value of Zuber:

For an internally financed firm like Zuber, dividends each year, the growth rate, and value would be:

Given f = 0.5 and i = 0.24 and a current *EAT* of $60 million, the total equity value of Zuber as a perpetual investment company would be $280 million:

or

Normal, Growth, and Declining Firms

Like our previous case, the Gordon-Williams model also can be used to define growth, declining, and normal firms. To see this, consider again the Zuber Company: an all-equity company with *EAT* of $67.20 million expected in year one [= (1 + *g*)EAT_0 = (1.12)$60 million], 5 million shares outstanding, investment policy of investing 50 percent of its earnings *(I*/*EAT* = 0.5), and investments financed internally (*f* = *I*/*EAT*). As before, assume Zuber's expected rate of return on its investment is 24 percent, and the beta on its project is equal to the firm's beta of two, the risk-free rate is 4 percent, and the market risk premium is 10 percent. Using the Gordon-Williams model, the company's expected growth rate in earnings (and dividends) would be *g* = *fi* = (0.5)(0.24) = 0.12, and the value of the company would be $280 million with a per share value of $56:

Growth				$i > k_e$			$\Delta V^e_0/\Delta f > 0$
Normal				$i = k_e$			$\Delta V^e_0/\Delta f = 0$
Declining				$i < k_e$			$\Delta V^e_0/\Delta f < 0$
f = RE/EAT	i	$g = fi$	EAT_1	$Div_1 = (1 - f)EAT_1$	k_e	$V^E = Div_1/(k_e - g)$	V^e
Normal			in millions	in millions		in millions	
0	0.24	0	$67.20	$67.20	0.24	$280.00	$56.00

0.5	0.24	0.12	$67.20	$33.60	0.24	$280.00	$56.00
0.75	0.24	0.18	$67.20	$16.80	0.24	$280.00	$56.00
Growth							
0	0.3	0	$67.20	$67.20	0.24	$280.00	$56.00
0.5	0.3	0.15	$67.20	$33.60	0.24	$373.33	$74.67
0.75	0.3	0.225	$67.20	$16.80	0.24	$1,120.00	$224.00
Declining							
0	0.2	0	$67.20	$67.20	0.24	$280.00	$56.00
0.5	0.2	0.1	$67.20	$33.60	0.24	$240.00	$48.00
0.75	0.2	0.15	$67.20	$16.80	0.24	$186.67	$37.33

EXHIBIT 11.5 Equity Value, Growth, and Investment Policy

Since this company is expected to earn the same rate of return on its investments that investors can earn in the market ($i = k_e$), any investment policy the company pursues will not change the value of the company. This is illustrated in Exhibit 11.5. As shown, if the company were to eliminate all future invest-

ments after year one and instead distribute all of its $67.20 million earnings in year one to its shareholders ($D/EAT = 1$ and $RE/EAT = f = 0$), the company would still be worth $280 million and $56 per share:

In contrast, if the company were to invest 75 percent of its earnings each year ($f = 0.75$), yielding a growth rate in earnings of 18 percent [$= fi = (0.75)(0.24)$], or invest nearly all of its earnings ($f = 0.999$; note the model is undefined at $f = 1$), then its value would still be $280 million and $56 per share:

As stated earlier in the case of the one-time-only investment, the reason the stock's value is invariant to the company's investments is because its management is expected to obtain the same risk-adjusted return on its investments that investors can obtain in the market. As previously noted, such a firm is known as a normal firm. If the company were able to obtain rates of return on its investments exceeding the required return, then its value would increase the more investments it undertakes (i.e., the greater f). This can be seen in middle panel of Exhibit 11.5, where the company's return on investments is expected to be 30 percent. In this case, if the company's investment expenditures are equal to 50 percent of its earn-

ings, then its growth rate in earnings would be 15 percent; its equity value, $373.33 million; and its per share value, $74.67:

If the company does not pursue its investment opportunities (f = 0), then its stock value would be only $280 million and $56 per share:

and if it increased its investment so that f = 0.75, then its growth rate would be 22.5 percent, its equity value would be $1,120 million, and its per share value would be $224.

As we defined previously, such a firm is a growth firm: one that can obtain returns on its investments that exceed the returns obtainable in the market. The value of such a firm will increase if investors see the company as pursuing its investment opportunities. It is possible, however, for a growth firm to decline in value. This would occur if investors in the market believe that such a firm was not pursing its investment opportunities.

Finally, if the company obtained returns on its investments that were less than the returns its shareholders could obtain in the market, then its equity value would decrease if the company pursued (or was expected to pursue) its investments. This can be seen in the lower panel of Exhibit 11.5, where the company's return on investments is expected to be 20 percent. In this case, if the company's investment expenditures are equal to 50 percent of its earnings, its growth rate in earnings would be 10 percent, its equity value, $240 million, and its per share value, $48:

If this declining company increased its investment so that $f = 0.75$, then its total equity value would decrease to $186.67 million and $37.33 per share.

In contrast, if the company does not undertake its investment opportunities (f = 0), then its stock value would increase to $280 million and $56 per share:

Hence, in this case of a declining firm, management can increase the equity value of the company by eliminating investments and paying all earnings to its shareholders who can obtain greater returns than

management by investing the cash flows themselves.

Good and Bad Investments

If investors in our example pay the equilibrium price for the stock, their expected return will be 24 percent regardless of whether the company is a normal, growth, or declining firm—their investment return and beta combination will be on the SML. The 24 percent return can be seen in Exhibit 11.6, where the annual price and dividend patterns are shown for the normal, growth, and declining firms for which the investment policy for each is assumed to be 50 percent of earnings ($f = 0.5$). Thus, in the case of the growth firm [$g = fi = (0.50)(0.30) = 0.15$], for example, if investors pay the a market price equal to the equilibrium value of \$74.67 [$= E(DPS_1)/(k_e - g) = \$6.72/(0.24 - 0.15)$], then their expected annual gain in price would be 15 percent based on an expected price of \$85.87 in year one and their expected annual dividend yield would be 9 percent [$= E(Div_1)/P_0 = \$6.72/\$74.67$], yielding a total return of 24 percent. As shown in the Exhibit 11.6, these yield patterns hold true for each year, if investors in the market price the stock equal to the equilibrium value.

Year	*EAT* (millions)	*DIV* (millions)	*DPS*	Share Price *E*(*d*)/ ($k_e - g$)	Expected Capital Gain	Expected Price Yield	Expected Dividend Yield	Total Yield
Normal	$f = 0.5$,							
	$i = 0.24$,							
	$g = 0.12$							
0				$56.00				
1	$67.20	$33.60	$6.72	$62.72	$6.72	0.12	0.12	0.24
2	$75.26	$37.63	$7.53	$70.25	$7.53	0.12	0.12	0.24
3	$84.30	$42.15	$8.43	$78.68	$8.43	0.12	0.12	0.24
4	$94.41	$47.21	$9.44	$88.12	$9.44	0.12	0.12	0.24
5	$105.74	$52.87	$10.57	$98.69	$10.57	0.12	0.12	0.24

6	$118.43	$59.21	$11.84	$110.53	$11.84	0.12	0.12	0.24
7	$132.64	$66.32	$13.26	$123.80				
8	$148.56	$74.28	$14.86					
Growth	f = 0.5,							
	i = 0.30,							
	g = 0.15							
0				$74.67				
1	$67.20	$33.60	$6.72	$85.87	$11.20	0.15	0.09	0.24
2	$77.28	$38.64	$7.73	$98.75	$12.88	0.15	0.09	0.24
3	$88.87	$44.44	$8.89	$113.56	$14.81	0.15	0.09	0.24
4	$102.20	$51.10	$10.22	$130.59	$17.03	0.15	0.09	0.24
5	$117.53	$58.77	$11.75	$150.18	$19.59	0.15	0.09	0.24
6	$135.16	$67.58	$13.52	$172.71	$22.53	0.15	0.09	0.24

7	$155.44	$77.72	$15.54	$198.61				
8	$178.75	$89.38	$17.88					
Declining	f = 0.5,							
	i = 0.20,							
	g = 0.10							
0				$48.00				
1	$67.20	$33.60	$6.72	$52.80	$4.80	0.1	0.14	0.24
2	$73.92	$36.96	$7.39	$58.08	$5.28	0.1	0.14	0.24
3	$81.31	$40.66	$8.13	$63.89	$5.81	0.1	0.14	0.24
4	$89.44	$44.72	$8.94	$70.28	$6.39	0.1	0.14	0.24
5	$98.39	$49.19	$9.84	$77.30	$7.03	0.1	0.14	0.24
6	$108.23	$54.11	$10.82	$85.03				
7	$119.05	$59.52	$11.90					

EAT, *DIV*, and *DPS* for year 1 are assumed to be the same for Normal, Growth, and Declining firms

Price Yield = Expected Capital Gain/Price; Div. Yield = $E(DPS)/P$; Total Yield = Price Yield + Dividend Yield

EXHIBIT 11.6 Price, Dividend, and Return Patterns

As an investment principle, an investment can be a good or bad one, depending on whether it underpriced or overpriced in the market. Just because a firm is a declining company does not mean it is a bad investment–that is, the stock could be underpriced. On the other hand, just because a firm is a growth company does not mean it is a good investment—that is, the stock could be overpriced. As we discussed previously, a good investment would be one in which the market price is below the equilibrium value. Buying underpriced stocks, in turn, provides investors with returns above the risk-adjusted return. In terms of the example shown in Exhibit 11.6, an investor who purchased the normal firm below its equilibrium value of $56 would earn a rate greater than the 24 percent rate provided in the market for stocks with a beta of two. Similarly, an investor who purchased the growth firm below its equilibrium of $74.67 or the declining firm below its equilibrium value of $48 would expect to receive a return greater than the risk-adjusted return of 24 percent. Thus, by buying underpriced stocks, an investor can obtain an investment return and beta combination above the SML. In contrast, an investor who purchased either the normal firm above its equilibrium value of $56, the growth firm above its equilibrium of $74.67, or the declining firm above $48 would earn a rate less than the 24 percent rate provided in the market for stocks with a beta of two. Thus, the purchase of overpriced securities can provide an investor with a return and beta combination below the SML.

In summary, the Gordon-Williams constant growth rate model is very restrictive. Obviously, companies pursue investments over time that differ in terms of their life, risk characteristics, and cash flow patterns. The contribution of the Gordon-Williams model, however, is not in its practicality, but rather in establish-

ing that the criterion for evaluating stocks should be based on determining whether a company's investment returns exceed the returns available in the market.

BLOOMBERG: CACS, CACT, AND SUSTAINABLE GROWTH RATE

CACS

The Bloomberg CACS screen is a good screen to use to identify a company's past and pending investments. On the screen, you can click M&A and IPO/ADDL screen, and set dates to bring up corporate investments, divestments, and other corporate actions.

CACT

The Bloomberg CACT screen is a good screen for investment activities for cross-sectional listings (e.g., stocks composing an index, portfolio formed in PRTU, or a search saved in EQS).

BLOOMBERG SUSTAINABLE GROWTH

The sustainable growth rate is equal to the investment policy (I/E) times the rate of return on its investments (i). For internally financed companies, the investment policy is equal to the retention ratio ($f = 1 - d/e$). The rate of return on corporate investments is highly correlated with the return on equity (ROE), and the retention ratio is considered a good measure of a company's long-run investment policy. Sustainable growth is often measured as the product of the retention ratio times the ROE: f ROE.

- Sustainable growth rates measured as the retention ratio times ROE for companies, industry indexes, and market indexes can be accessed from Bloomberg's FA, GF, and FA screens.
- The RV screen can be used to compare sustainable growth rates for a company and its peers. Use the Custom tab to search for sustainable growth, return on equity, and retention ratio.

See Bloomberg Web Exhibit 11.4.

Case 2: Two-Dollar General Store

Two-Dollar General Store Inc. franchises discount stores nationally. Suppose the company has the following features:

- All equity company.
- Current EAT_0 = $24 million.
- Corporate investment policy in which its annual investments equal 75 percent of its *EAT*.
- Investment financing done internally.
- Estimated rate of return on its investments = i = 0.20.
- Beta of the firm and beta of the company's investments = 2.
- SML: $k_e = 0.05 + [0.10]\beta$.
- The above features are expected to characterize this company for a long time.
- Number of shares = 5 million.

If we expect the company to maintain its investment policy, internal financing, and investment returns for a many years, then the value of Two-Dollar General Store could be determined by the Gordon-Williams model. Specifically, based on the above features, Two-Dollar's growth rate would be 15 percent [= (0.75)(0.20)], its investment policy would equal its retention ratio of 0.75, and its dividend payout ratio would be 0.25. With a growth rate of 15 percent, Two-Dollar's EAT_1 would be $27.6 million [= $EAT_0(1 + g)$ = $24 million (1.15)] and its Div_1 would be $6.90 million [= $(1 - f)EAT_1$ = (1 – 0.75)$27.6 million], and *DPS* would be $1.38. The total equity value of Two-Dollar General Store would therefore be $69 million, and the share value would be $13.80.

If investors were to price Two-Dollar at $13.80 per share and over time the assumptions underlying this scenario regarding investment returns, investment policy, and internal financing were realized, then investors would earn a 25 percent return. As shown in Exhibit 11.7, the 25 percent return would consist of a 15 percent price yield and a 10 percent dividend yield, the price of the stock would increase over five years from $13.80 to $27.76, and its dividends per share would increase from $1.20 to $2.78 over that period—again if these assumptions hold.

Year	*EAT* (millions)	*DIV* (millions)	*DPS*	Share Price $E(d)/(k_e - g)$	Expected Capital Gain	Expected Price Yield	Expected Dividend Yield	Total Yield
	f = 0.75,							
	i = 0.20,							
	g = 0.15							
0	$24.00	$6.00	$1.20	$13.80				
1	$27.60	$6.90	$1.38	$15.87	$2.07	0.15	0.10	0.25
2	$31.74	$7.94	$1.59	$18.25	$2.38	0.15	0.10	0.25
3	$36.50	$9.13	$1.83	$20.99	$2.74	0.15	0.10	0.25
4	$41.98	$10.49	$2.10	$24.14	$3.15	0.15	0.10	0.25
5	$48.27	$12.07	$2.41	$27.76	$3.62	0.15	0.10	0.25

6	$55.51	$13.88	$2.78					
	f = 0.50,							
	i = 0.20,							
	g = 0.10							
0	$24.00	$12.00	$2.40	$17.60				
1	$26.40	$13.20	$2.64	$19.36	$1.76	0.1	0.15	0.25
2	$29.04	$14.52	$2.90	$21.30	$1.94	0.1	0.15	0.25
3	$31.94	$15.97	$3.19	$23.43	$2.13	0.1	0.15	0.25
4	$35.14	$17.57	$3.51	$25.77	$2.34	0.1	0.15	0.25
5	$38.65	$19.33	$3.87	$28.34	$2.58	0.1	0.15	0.25
6	$42.52	$21.26	$4.25					

EXHIBIT 11.7 Prices, Dividends, and Yields for Two-Dollar General Store

Suppose an analyst reports that Two-Dollar's managers have indicated that they do not see the growth in

its store expansion to be as great as first forecasted and have revised their long-term investment policy to be equal to 50 percent of its *EAT*. Based on this report, Two-Dollar's growth rate would be 10 percent [= (0.50)(0.20)], it investment policy and retention ratio would be 0.50, and its dividend payout ratio would be 0.50. With a growth rate of 10 percent, Two-Dollar's EAT_1 would, in turn, be $26.4 million [= $EAT_0(1 + g)$ = $24 million (1.10)], its Div_1 would be $13.2 million [= $(1 - f)EAT_1$ = (1 − 0.50)$26.4 million], and its DPS_1 would be $2.64. The total equity value of Two-Dollar General Store based on this report would be $88 million, and the share value would be $17.60:

The lower panel in Exhibit 11.7 shows the prices, dividends, and yields over several years based on this investment return, investment policy, and internal financing.

There are two inferences to draw from this case. First, note the wide difference in prices as a result of investment opportunities. With the optimistic investment opportunity characterized by a 75 percent investment policy, investors would price Two-Dollar at $13.80 using the Gordon-Williams model, and with the conservative investment opportunity projection of 50 percent, they would price the stock at $17.60. The market price of the stock would eventually move to where the consensus position is on Two-Dollar's growth. Moreover, this is a position that could change with new information.

The second inference to draw from this case is that Two-Dollar's stock value was lower under the scenario of reduced future investments in new stores. This can be explained by the fact that Two-Dollar is a declining firm. It has a beta of two and return on its investments of 20 percent compared to its required return of 25 percent. The equity value of Two-Dollar would increase if investors expected the company to

reduce its futures investments and pay more of its earnings to shareholders who could obtain greater returns than management by investing the cash flows in the market.

Two-Stage and Three-Stage Growth Models

The assumption that a company can maintain a constant growth rate for a long time is unrealistic for many companies, especially those in early stages of development. As we examined in Chapter 3, a two-stage growth or three-stage growth model may be more applicable.

In the case of Two-Dollar General Store, suppose that in addition to an investment policy of 50 percent of its *EAT* the analyst also reports that Two-Dollar's management believes that the company will experience an investment return in each of its first three years of i = 30% and then afterward will obtain a 20 percent return. Based on this report, Two-Dollar's growth rate would be 15 percent [= fi = (0.50)(0.30)] for three years and 10 percent thereafter [= fi = (0.50)(0.20)]. The total equity value of Two-Dollar General Store using two growth rates would be $99.07 million, and its per share value would be $19.81:

Finally, suppose that an analyst believes Two-Dollar's future dividend flow will follow the three-stage growth model similar to Bloomberg's DDM discussed in Chapter 3 with the following features:

1. *EPS* will be $4.80 for FY1, $5.52 for FY2, and $6.35 for FY3 based on consensus estimates.
2. The length of the initial growth stage will be seven years with the annual growth rate estimated to be 15 percent for that period.
3. The length of the transitional stage will be 10 years.
4. The mature growth period will start in year 20 with an assumed dividend-payout ratio of 75 percent and with a growth rate of 6.25 percent. The mature growth rate will be equal to the discount rate of 25 percent times the retention ratio (0.25).
5. The transition period starts in year 11, with the growth rate decreasing by increments of 0.875 percent per year [= (15% – 6.25%)/10] from 15 percent to 6.25 percent. Column 2 in the table in Exhibit 11.8 shows the growth rates for each year (starting in year 4) and its corresponding *EPS* ($EPS_t = EPS_{t-1}(1+g_t)$).
6. The dividend-payout ratio for the first 10 years (FY1–FY3 plus the seven-year growth period) will be equal to the dividend-payout ratio for FY1 of 0.25 (= DPS_{FY1}/EPS_{FY1} = $1.20/$4.80).

7. Starting in year 11 (the first year of the transition period), the payout ratios start to increase by annual increments of 5 percent [= (75% − 25%)/10] to reach the model's assumed payout rate of 75 percent at year 20, the last year of the transition period.
8. From year 20 on, the dividend payout stays at 25 percent.
9. The dividends-per-share each year will be equal to the *EPS* times the payout ratio.
10. The value of Two-Dollar's equity in year 20 will be equal to Gordon's constant growth model value ($V = d/(k - g)$).

1	2	3	4	5	6
Year	Growth Rate	*EPS*	Dividend Payout Ratio	*DPS*	*PV* at $k = 0.25$
1		$4.80	0.250	$1.200	$0.96
2		$5.52	0.250	$1.380	$0.88
3		$6.35	0.250	$1.588	$0.81
4	0.1500	$7.30	0.250	$1.826	$0.75
5	0.1500	$8.40	0.250	$2.099	$0.69
6	0.1500	$9.66	0.250	$2.414	$0.63
7	0.1500	$11.11	0.250	$2.777	$0.58
8	0.1500	$12.77	0.250	$3.193	$0.54
9	0.1500	$14.69	0.250	$3.672	$0.49
10	0.1500	$16.89	0.250	$4.223	$0.45
11	0.1413	$19.28	0.300	$5.783	$0.50

1	2	3	4	5	6
Year	**Growth Rate**	***EPS***	**Dividend Payout Ratio**	***DPS***	***PV* at *k* = 0.25**
12	0.1325	$21.83	0.350	$7.641	$0.53
13	0.1238	$24.53	0.400	$9.813	$0.54
14	0.1150	$27.35	0.450	$12.309	$0.54
15	0.1063	$30.26	0.500	$15.130	$0.53
16	0.0975	$33.21	0.550	$18.266	$0.51
17	0.0888	$36.16	0.600	$21.695	$0.49
18	0.0800	$39.05	0.650	$25.383	$0.46
19	0.0713	$41.83	0.700	$29.283	$0.42
20	0.0625	$44.45	0.750	$33.336	$0.38
20	0.0625	$47.23	0.75	$188.90	$2.18
				V_{20}	**Intrinsic Value**

1	2	3	4	5	6
Year	**Growth Rate**	***EPS***	**Dividend Payout Ratio**	***DPS***	***PV* at *k* = 0.25**
					$13.87
Growth Years			**Maturity**		
Growth Rate = 0.15			Dividend Payout Rate = 0.75		
Dividend Payout Rate = 0.75			Growth Rate = (1 – Payout Rate)(Discount Rate)		
Transitional Years			Growth Rate = (0.25)(0.25) = 0.0625		
Annual Growth Rate Decrease = 0.00875			$EPS_{21} = EPS_{20}(1 + g)$ =44.4479(1.0625) = 47.2259		
Annual Payout Rate Increase = 0.05			DPS_{21} = (Payout Rate)EPS_{21} = (0.75)(47.2259) = 35.42		
			$V_{20} = DPS_{21}/(k - g)$ = 35.42/(0.25 – 0.0625) = $188.90		

EXHIBIT 11.8 Value of Two-Dollar General Store Using Three-Stage DDM Model

Exhibit 11.8 shows the cash flow calculations of Two-Dollar General Store. Discounting each *DPS* and the

terminal value by the discount rate of 25 percent (Column 6), we obtain an intrinsic value for Two-Dollar General Store of $13.87.

Determining which growth-rate model an analyst should use depends on the type of the company being evaluated. Companies in emerging industries such as new technologies, for example, are typically characterized by multistage growth periods. For such companies, there is often an initial period of extraordinary growth in which the companies in the new industry are expanding their manufacturing and marketing base to meet the immense domestic and possible world demand for their products. The length of this initial period can vary depending on capital requirements, the ease of entry of new firms into the industry, the emergence of subsequent technology, and the potential demand. The initial growth stage for General Motors, Ford, and Chrysler arguably lasted as long as 50 years (from 1920 to 1970). In contrast, companies in more mature industries, such as steel manufacturing, food processing, or mining, may be better characterized by a constant growth rate model in which their dividends and earnings are expected to grow at a steady state rate. However, it is important to remember that such companies can be influenced by external factors, both good and bad, which can transform them into an emerging industry again. For example, many analysts who considered the banking industry to be mature and stable in the 1960s saw it transformed into a growth industry as a result of the liberalization of banking laws and the emergence of new technology. Similarly, the fall of communism in the 1980s and the emergence of China, India, and Brazil in the last 20 years has led to new markets for the product of many companies in mature industries.

BLOOMBERG DDM SCREEN

Bloomberg's DDM model estimates the intrinsic value of a selected equity using a three-stage growth model. The screen also can be used to calculate the IRR, expected return, and implied growth rate based on a series of assumptions. Estimates for *EPS* for FY1–FY3, dividend payout ratio, growth rates, length of years for stage 1 growth and transition years, and discount rates appear in the amber boxes. You can change any of the assumptions. See Bloomberg exhibit box in Chapter 3: Bloomberg DDM Screen and Exhibit 3.15 for the DDM screen for Disney. You can change the DDM model to reflect your own assumptions.

See Bloomberg Web Exhibit 11.5.

Mergers and Acquisitions

As perpetual investment machines, blue-chip companies not only invest in new endeavors, but they also buy the assets and divisions of other companies, frequently sell their own assets and divisions (divestments and equity sales), acquire companies in which they gain control (acquisition), absorb the assets and liabilities of other businesses (merger where the acquired company loses its independent existence), and consolidate with two or more firms to form an entirely new company (consolidation).

Mergers, consolidations, acquisitions, and equity sales are complicated undertakings. Consideration of such activities—both real and potential—is an important part of the valuation of a company. As noted in Chapter 5, investment banks are very active in mergers, consolidations, acquisitions, and equity sales, serving both the acquirers and the target firms. Acquiring firms use investment bankers to help them identify attractive firms to pursue, to solicit shareholders who might sell, to structure tender offers, to

raise financial capital, and to structure the deal. Targeted firms may use investment banks to indicate their interest and commitment or possibly their disinterest and protection, especially when there is a hostile takeover effort. The decision to buy or sell assets, divisions, and other companies also necessitates the need to raise funds to finance the acquisition of another company or an investment, or as in the case of an equity sale, it may be necessitated by the need to raise funds to pay off debt obligations to avoid bankruptcy or to acquire another company. Exhibit 11.9 defines some of terms and identifies some of the technical points related to corporate acquisitions.

Terms

- ***Acquisition*:** One firm gains control of another firm.
- ***Merger*:** One company absorbs the assets and liabilities of another company and assumes the company's business. The acquired company loses its independent existence.
- ***Consolidation*:** Two or more firms combine to form an entirely new entry. Shares of each of the consolidated firms are exchanged for shares of the new firm. Both of the consolidated firms lose their independence, often becoming subsidiaries of a new firm or becoming a new firm.
- ***Stock Acquisition*:** Company purchases another company's stock (in the open market or via a tender offer). The acquiring firm can still obtain the target company's assets and liabilities, but no shareholder meeting is required.
- ***Tender offer*** is an offer to purchase.
- ***Asset Acquisition*:** An acquirer purchases only the assets of another firm (liabilities remain the responsibility of the selling firm).
- ***Horizontal Merger*:** Merger of two firms in the same line of business.
- ***Vertical Merger*:** Merger that either integrates a firm forward toward the consumer (manufacturing company buying a retailer) or backward toward the source of supply (manufacturing company buying a mineral extracting company).
- ***Conglomerate Merger*:** Merger of two firms in unrelated businesses.

Technical Points

- ***Shareholder Approval*:** A merger or consolidation must comply with each corporation's charter. Many corporation charters require a simple majority vote of the firm's shareholders for approval; some require 2/3.

- ***Tax Treatment*:** The IRS will treat the acquisition as tax-free if the targeted shareholders are treated as having exchanged their old shares for substantially new ones. Each acquiree who receives stock does not have to pay any tax on the gain until the shares are sold. The acquirer's tax base in each asset that is transferred is the same as the acquiree's (as it relates to depreciation, tax carry forwards, etc.)
- ***Accounting Issues*:** Acquisitions involve difficult accounting issues. In a pooling of interest, the assets, liabilities, and operating statements of the firms are added together without any adjustment to values.
- ***Antitrust Considerations*:** A merger or consolidation must comply with federal antitrust laws, state anti-takeover statutes, corporate charters, and federal and state security laws. The Clayton Act, Section 7, forbids a firm to purchase the assets or stock of another firm if the purchase substantially lessens competition or creates a monopoly in any line commerce or any section of the country.
- ***Tender Offer*:** A tender offer is an offer to purchase shares at a stated price from shareholders of the target firm who are willing to tender shares at that price. Tender offers are usually cash offers. With a cash tender offer, the acquirer does not have to register new securities. SEC rules do require the acquirer to file a notice of the offer and to keep the offer open for at least 20 days. The acquirer usually sets conditions in the offer so that it does not have to buy any shares unless the required minimum number is tendered. The tender offer usually specifies the purchases of just enough shares so that it can effectively control the company (20% to 40%). Once the acquirer has purchased shares via the tendered offer, then it can effect a merger structured to achieve 100% ownership and organize so as to realize a tax-free acquisition. Once the potential acquirer has made a tender offer, it may follow the offer by purchasing the target firm's stock in the open market. This is done if the potential acquirer believes other company will also make offers. If a higher bidder emerges, then the initial company who put the target company into 'play' will profit from owning the stock.

- ***Proxy Contest*:** Tender offers are expensive because the bidder must purchase enough shares to secure control. Alternatively, one or more parties can initiate a proxy contest. The dissidents solicit SH's proxies to vote their shares in favor of their slate of directors.

Anticipatory Defensive Tactics

- ***Dual-Class Recapitalization*:** Firm distributes a special class of common stock that possesses superior voting rights (e.g., 10 votes per share).
- ***Employee Stock Ownership Plan*:** The firm sells shares to employee groups and then uses the funds to acquire outstanding shares in the market.
- ***Super Majority*:** Firm's charter is amended to require a super majority (e.g., 80%) to be voted in favor of a merger.
- ***Flip-in Poison Pill*:** Firm issues rights to its shareholders (often one right per share) that give the holder the right to purchase, at say half the market price, shares of the firm's stock if a potential acquirer acquires more than a specified percentage of the firm's shares.
- ***Flip-out Poison Pill*:** Firm issues rights to its SHs that give the holders the right to purchase at a lower price shares of the acquirer's firm's stock if a potential acquirer acquires more than a specified percentage of the firm's shares. Note: The acquiree's board usually has the right to redeem the rights for a nominal fee (e.g., $0.05/right) if it approves the acquisition.

Responsive Defensive Tactics

- ***Asset Purchase or Sale*:** The firm purchases assets that the bidder does not want or would create antitrust problems. The firm sells assets the acquirer may want—sells the crown jewels.

- ***Leveraged Recapitalization*:** Firm borrows large sums and distributes the proceeds as cash or repurchases its stock.
- ***Pac-Man Defense*:** The firm makes a counter bid for the stock of the potential acquirer.
- ***Golden Parachute*:** The firm's board approves generous payment to managers who lose their jobs as a result of a takeover.

EXHIBIT 11.9 List of Merger and Acquisition Terms

Every year there are thousands of mergers, acquisitions, and consolidations. To see the complexities of such deals, consider a merger in which one company acquires another corporation. Often, when a merger is being proposed, one company will make a *tender offer* to the shareholders of the targeted company offering to buy their shares at a specified price if they will agree to give up all existing shares. To induce shareholders to give up their shares, the tender offer has to be attractive. A targeted company with its stock trading for $20 might be offered cash or shares of the acquiring company worth $30 per share if the shareholders will agree to the merger. As a result, many analysts have investment strategies in which they try to identify companies they believe will be merger targets. Such strategies often involve evaluating certain industries, such as banking, airlines, or communications, in which technology or regulatory changes have made consolidation in such industries more profitable. Another strategy is to follow companies that have either implicit or explicit policies of acquiring companies.

Although the tender offer will serve to increase the stock price of the acquired company, the price of the acquiring company's stock often decreases, at least in the short run. In the long run, the value of the acquiring company will increase if there is *synergy* in combining the two companies. Synergy occurs when the combined value of the two companies, V^{XY}, is greater than the sum of the values of the companies:

In practice, synergy is often the result of economies of scale. Economies of scale can be defined as the output and input (labor and capital) relation of a firm. If there are increasing (decreasing) returns to scale, then a proportional increase in the scale of operation will lead to a greater (smaller) proportional increase in output. When increasing returns to scale exist, a firm can reduce its average cost of producing and thereby increase its profit by simply increasing its scale of operation.[4] In many mergers involving companies in the same industry, the economic justification of the merger is based on an argument that increasing returns to scale exist. Synergy may also be realized by combining companies with different competitive advantages, for example, the merger of one company with production and engineering proficiencies with a company with marketing expertise, or the merger of one company with a strong market in one geographical area with a company with a strong market in another. Synergy could also come from potential tax benefits in which the acquired firm has a tax loss carry forward of which it cannot take full advantage. Similarly, synergy could come from an excessive cash position in which the targeted firm has a substantial cash position but few capital investment opportunities. Finally, it may be that the company can gain by buying the company and selling its assets and division—buying the company and stripping it. This would be feasible if the sum of the values of the assets to be stripped were greater than the price for acquiring the company—the sum of the values of assets was greater than the combined value.

Merger Case

In evaluating mergers from the perspective of the acquiring company, a valuation approach can be used to determine the new value of the company resulting from the merger and whether or not the tender offer is correctly priced. This approach requires that the analyst estimate the synergy effect. To see this, suppose an analyst is evaluating a targeted merger in which Company X, a $600 million company (value of its assets), is targeting Company Y, a $610 million company. Suppose both companies being analyzed are expected to last a long time, each has only long-term debt, neither has depreciation and depletion al-

lowances or future investment plans, and each has an effective tax rate of 40 percent, a cost on debt of 10 percent, and a dividend-payout ratio of one.

Suppose the analyst estimates that Company X will generate an annual *EBIT* of $80 million, $30 million annual interest payments on its debt of $300 million [= (0.10)($300 million)], taxes of $20 million, *EAT* of $30 million, 5 million shares, and an *EPS* and *DPS* of $6.00:

She, in turn, estimates that Company Y will generate an annual *EBIT* of $100 million, interest payments of $25 million on its $250 million debt [= (0.10)($250 million)], taxes of $30 million, *EAT* of $45 million, 5 million shares, and an *EPS* and *DPS* of $9.00:

Based on revenue and earnings, company Y is larger than Company X. Suppose the analyst sees Company Y as being riskier than X, estimating Y's beta to be 1.5 and X's beta to be one. Using the CAPM and determining a risk-free rate of 5 percent and market risk-premium of 5 percent, she estimates the required return on X's equity to be 10 percent and the required return on Y's equity to be 12.5 percent:

Given her assessment that both companies are expected to last a long time and not make any investments, the analyst would value X's equity at $300 million and Y's at $360 million:

With X having $300 million in debt, the market value of its assets would be $600 million, and based on market values, X's overall cost of capital, k_C, would be 10 percent and its tax-adjusted cost of capital k_C^T, 8 percent:

With debt of $250 million, Y's asset, in turn, would be valued at $610 million, its overall cost of capital, k_C, would be 11.4754 percent, and its tax-adjusted cost of capital, k_C^T, 9.8361 percent:

The financial information on the two companies is summarized in Exhibit 11.10.

	Pre-Merger Valuation	
Company	**X**	**Y**
EBIT	$80,000,000	$100,000,000
Interest (k_d = 0.10)	$30,000,000	$25,000,000
EBT	$50,000,000	$75,000,000
tax (t = 0.4)	$20,000,000	$30,000,000
EAT	$30,000,000	$45,000,000
β	1.00	1.50
k_e = 0.05 + (0.05) Beta	0.10	0.125
k_d	0.10	0.10
$k_C{}^T = (V_E/V_A)k_e + (V_D/V_A)\, k_d\, (1 - t)$	0.08	0.0984
Value of Equity: $V^E = EAT/k_e$	$300,000,000	$360,000,000
Value of Debt: V_D = Interest/k_D	$300,000,000	$250,000,000

	Pre-Merger Valuation	
Company	**X**	**Y**
Value of Asset: $V_A = V_E + V_D = EBIT(1 - t)/k_C^T$	$600,000,000	$610,000,000
Number of Shares = n	5,000,000	5,000,000
Equity value per share: $V^e = V^E/n = EPS/k_e$	$60	$72
Debt/Equity = V_D/V_E	1.00	0.694

EXHIBIT 11.10 Merger Case: Pre-Merger Values of X and Y

Synergy and Merger Premium

Finally, suppose the analyst estimates that if the two firms merge, then their combined *EBIT* will be $200 million, which exceeds the sum of their *EBITs* of $180 million. Thus, she estimates a synergy between the firm in which:

The weighted beta of the merged companies using each company's pre-merger market values is 1.2727, the cost of equity is 11.3636 percent, and the overall cost of capital adjusted for taxes is 8.926 percent:

The value of assets of the merged company given $200 million *EBIT* and a cost of capital of 8.9256 percent is therefore$1,344.44 million:

Subtracting, the combined debt of $550 million of X and Y from the $1,344.44 million asset, the equity value of the merged companies would be $794.44 million:

Note that the value of the combined assets without synergy (i.e., using *EBIT* = $180 million), is $1,210 million and the combined value of equity is $660, which is equal to the sum of the X and Y's asset and

equity values:

If the analyst believes that the synergy exists, then she would see the merger as leading to a gain in equity value or *merger premium* of $134.44 million:

Tender Offer, Exchange Ratio, and Post-Merger Stock Value

As an investment in Stock X, an analyst would consider X to be a good investment (i.e., the stock price increasing as a result of the merger) if X was able to purchase Company Y's five million shares for less than $494.44 million—the value of Y's equity plus the merger value—or $98.89 per share.

In a merger, the acquiring company may pay for the acquisitions in cash (perhaps selling an asset or a division to raise the cash needed to purchase the company). Company X, for example, might offer to buy Y's five million shares for $98.89 per share in cash. The total acquisition cost would be $494.44 million. Note this cost does not include the transaction costs nor does it take into account the debt. It may be that after acquiring Y, X could refinance Y's $250 million debt for less than 10 percent, making the actual acquisition cost less.

For many mergers, the acquiring firm buys the targeted company by exchanging shares of their stock for the acquired company's shares; they also might buy the company with a combination of cash and shares. In a stock-for-stock acquisition, it is customary for the acquiring company to negotiate an exchange ratio with the target company: the number of shares of the acquiring company's stock for one share of the target company. In the example, X's stock has a premerger value of $60/share, and X's maximum offer value to buy Y is $98.89/share. The equivalent of X buying stock Y for $98.89 per share would be to exchange 1.6481 (= $98.89/$60) shares of X for one share of Y—an exchange ratio of 1.6481.

As an investment in Stock X, our analyst would consider X to be a good investment (i.e., the stock price increasing as a result of the merger) if X were able to purchase Y at an exchange ratio less than 1.6481. At an exchange ratio of 1.6481 (which reflects the maximum offer price of $98.89) the postmerger value of X would be equal to premerger value of $60 per share. In this case, X would have to create 8.241 million

new shares [(n_N = (1.6481 Shares of X/Shares of Y)(5 million shares of Y) = 8.241 million] to exchange for the five million share of Y. Company X's postmerger number of shares of X would therefore be 13.241(= 5 million premerger share of X plus 8.241 million new shares). With the analyst's estimate of $794.44 million for the value of equity of the merged company (which reflects the synergy), the postmerger value per share of X would be $60:

If the exchange ratio were less than 1.6481 (reflecting an offer price less than the maximum offer price of $98.89), then the postmerger value would exceed the premerger value of $60. For example, if the ratio were 1.5 (reflecting an offer price of $90), then X would need 7.5 million new shares to acquire Y and the postmerger value would be $63.56.

Inference

Mergers can be quite complex as well as challenging to evaluate. In trying to determine the impact a merger would have on a company's value, the preceding case suggests that two factors that are important in evaluating a merger are synergy and the price paid or the exchange ratio.

In terms of the preceding case, if there was no synergy from merging X and Y, then the equity value of X and Y would be $660 million. If this were the case, the merger premium would be zero, the maximum offer price would simply be the value of Y's stock of $72, and the maximum exchange ratio would be 1.20 (= $72/$60). Thus, in a stock-for-stock exchange, X would have to create six million new shares [(n_N =

(1.2 shares of X/shares of Y)(5 million shares of Y) = 6 million] to exchange for Y's five million. If the exchange ratio were 1.2 and there is no synergy, then the postmerger value would be $60.

Thus, for a merger to increase the acquiring company's stock, there has to be either synergy (increase in V_E^{XY}), an exchange ratio that is less than the ratio that reflects the maximum tender offer, or some combination to increase the stock price from its $60 premerger value. The expected postmerger values of the X and Y merger for different scenarios are presented in Exhibit 11.11.

XY	Synergy with Maximum Exchange Ratio	Synergy with Exchange Ratio less than Maximum (1.5)	No Synergy with Maximum Exchange Ratio	No Synergy with Exchange Ratio less than Maximum (1.1)
$EBIT^{XY}$	$200,000,000	$200,000,000	$180,000,000	$180,000,000
Interest^{XY}	$55,000,000	$55,000,000	$55,000,000	$55,000,000
$EBIT^{XY}$	$145,000,000	$145,000,000	$125,000,000	$125,000,000
Tax (t = 0.4)	$87,000,000	$87,000,000	$75,000,000	$75,000,000
EAT^{XY}	$58,000,000	$58,000,000	$50,000,000	$50,000,000
β^{XY}	1.2727	1.2727	1.2727	1.2727
$k_e{}^{XY} = 0.05 + (0.05)\beta^{XY}$	0.1136	0.1136	0.1136	0.1136
$k_d{}^{XY}$	0.1000	0.1000	0.1000	0.1000

k_C^{TXY}	0.0893	0.0893	0.0893	0.0893
Value of Asset: $V_A^{XY} = EBIT^{XY}(1 - t)/k_C^{TXY}$	$1,344,444,444	$1,344,444,444	$1,210,000,000	$1,210,000,000
Value of Debt = $V_D^{XY} = V_D^X + V_D^Y$	$550,000,000	$550,000,000	$550,000,000	$550,000,000
Value of Equity: $V_E^{XY} = V_A^{XY} - V_D^{XY}$	$794,444,444	$794,444,444	$660,000,000	$660,000,000
Merger Premium: $V_E^{xy} - (V_E^X + V_E^Y)$	$134,444,444	$134,444,444.44	$0.00	$0.00
Maximum Offer Price = V_E^Y + Merger Premium	$494,444,444	$494,444,444	$360,000,000	$360,000,000
Per share Maximum Tender offer = Max Offer Price/n^Y	$98.89	$98.89	$72.00	$72.00

Exchange ratio = Per share Max Tender offer/V_e^X	1.6481	1.5000	1.2000	1.1000
n_N = Total number of shares	8,240,741	7,500,000	6,000,000	5,500,000
Post-merger number of shares of $X = n^X + n_N$	13,240,741	12,500,000	11,000,000	10,500,000
Post-merger value per share = $V_E^{XY}/(n^x + n_N)$	$60.00	$63.56	$60.00	$62.86

$kc^{TXY} = (V_e^X + V_e^y)/(V_a^x + V_A^Y)k_e^{XY} + (V_d^Y + V_D^Y)/(V_A^X + V_A^Y)k_d^{XY}$.

$\beta^{XY} = (V_E^X/(V_E^X + V_E^Y)\beta^X + (V_E^Y/(V_E^X + V_E^Y)\beta^Y$.

n_N = Total number of new shares of X = (Exchange Ratio)(n^Y).

EXHIBIT 11.11 Merger Case: Expected Post-Merger Values of Merged XY Companies—Different Scenarios

In the financial markets, mergers often lead to a decrease in the stock price. If the markets are efficient, the decrease would suggest that the acquiring company pays too much for the target stock.

It should be noted that not all mergers are based on synergy. Sometimes a buyout company is formed through an investment company to acquire another company and then strip it; that is, sell its assets. Such acquisitions were prevalent in the 1980s, and they have often been portrayed in movies (such as *Wall Street* and *Other People's Money*) and in the press as sinister. Moreover, the financial scandals of the 1980s that led to the convictions of Ivan Boesky and Michael Milken certainly gave credence to such views. Nevertheless, there are cases in which a company is worth less than the sum of the values of the assets that compose it. In such cases, economic efficiency is realized by a buyout company acquiring such a company and then selling its assets. Similarly, a buyout company may be formed to take advantage of leverage. As noted earlier, many leverage buyout companies were formed in the 1980s. These companies would issue low-quality, higher yielding bonds and use the proceeds to acquire companies. As we noted earlier, because of the interest tax deduction, the emerging, more highly leveraged company often was able to realize greater earnings to its investors, although it was often a riskier company than the one that existed before the takeover.

BLOOMBERG M&A SCREEN

The Bloomberg MA screen allows you to analyze previous mergers and acquisitions, as well as new or pending deals. You can drill into a deal by clicking the entry and then using the tabs. MA <Enter>; On the MA screen, enter company name in the "Company Search" box to find company; click the deal to bring up screens for analysis of the deal.

OTHER BLOOMBERG MERGER AND ACQUISITION SCREENS

- **MARB**: Merger and Arbitrage Differentials.
- **MADL**: Merger and Acquisition Deal list.
- **CACS**, Click M&A.
- **CACT**, Click M&A.

See Bloomberg Web Exhibit 11.6.

Conclusion

Fundamental stock analysis involves determining whether stocks are correctly priced in the market. As we noted, in practice the ability to earn abnormal returns by finding mispriced stocks is a difficult task, requiring not only an understanding of the company and its current operations, but also the ability to forecast where the company is headed in both the near and long term. In this chapter, we have provided a foundation for fundamental analysis by examining at a theoretical level how factors such as corporate investment, capital structure, and mergers affect stock value.

In the next chapter, we introduce several empirical approaches that have been used by analysts to estimate stock value. The two most common approaches used by fundamentalists to select stocks are the discounted cash flow (DCF) method and the multiplier approach. The DCF approach is the valuation approach we have examined in this chapter. It involves either determining the present value of the stock's future cash flows or estimating the stock's expected rate of return by solving for the rate that equates the present value of the stock's cash flows to its market price. The multiplier approach involves estimating the stock's price to earnings-per-share ratio and its expected earnings next year to determine its value.

Notes

1. Geologists can estimate the annual production of crude oil based on the estimated size of the well's reserves and the pressure in the well (which is a function of the size of the well and its rate of output). The output of most oil wells decreases over time, rather than staying constant.

2. The irrelevance of financing argument was first introduced by Modiglini and Miller. It is also referred to as the dividend irrelevance argument.

3. Note that the definitions of growth, declining, and normal firms are consistent with acceptance rules applied to capital budgeting techniques. That is, if an investment project has a net present value exceeding zero, then the risk-adjusted return on the investment exceeds the required return, and an acceptance of the investment project will increase the equity value of the company.

4. In economics, economies of scale are often depicted by a long-run U-shaped average cost curve where long-run average cost is plotted against output. The negatively sloped portion of the curve represents the range of increasing returns to scale and the positively sloped portion defines the range of decreasing returns to sale. A company operating on the negatively sloped portion could reduce its average cost by increasing its output.