

CAPITAL STRUCTURE AND DIVIDEND POLICY

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CHAPTER 14

CAPITAL STRUCTURE AND LEVERAGE

Debt: Rocket Booster or Anchor?

If it is to grow, a firm needs capital, and that capital can come in the form of debt or equity. Debt financing has two important advantages: (1) Interest paid on debt is tax deductible, whereas dividends paid on stock are not deductible. This lowers debt's relative cost. (2) The return on debt is fixed, so stockholders do not have to share the firm's profits if it is extremely successful.

However, debt also has disadvantages: (1) Using more debt increases the firm's risk, which raises the costs of both debt and equity. (2) If the company falls on hard times and its operating income is not sufficient to cover interest charges, the stockholders will have to make up the shortfall; if they cannot, the firm will go bankrupt. Good times may be just around the corner, but too much debt can keep the company from getting there and thus can wipe out the stockholders' equity.

Because of these factors, companies with volatile earnings and operating cash flows tend to limit their use of debt. On the other hand, companies with less business risk and more stable operating cash flows can take on more debt. Kellogg Co., the world's largest cereal manufacturer, is a good example of a company that uses a lot of debt financing. Indeed, just after its acquisition of Keebler Food Co., Kellogg's capital structure consisted of 86 percent debt and 14 percent equity. An 86 percent debt ratio is quite high, though, and Kellogg's management was well aware that high debt can push an otherwise well-regarded company into bankruptcy. Aware of this possibility, Kellogg's management began to pay down its debt and restore its balance sheet to a more "reasonable" level, so by mid-2005 its debt ratio had stabilized at about 60 percent.

For many companies, a 60 percent debt ratio would still be considered quite high. However, because its business is so stable, this ratio is not too bad for

Kellogg Co.

Kellogg. After all, the consumption of Frosted Flakes and Pop Tarts has remained stable even during economic downturns. Moreover, if we examine Kellogg's capital structure in more detail, it soon becomes apparent that there is more here than meets the eye. According to its balance sheet, Kellogg has about \$4.8 billion of total debt versus stockholders' equity of about \$2.8 billion. But in June 2005, the market capitalization of Kellogg's equity (which is simply the stock price times the number of shares outstanding) was approximately \$17.7 billion. From a market value perspective, Kellogg's capital structure (\$4.8 billion of debt and \$17.7 billion of equity) is much more conservative, which helps explain why the company has a relatively strong BBB+ level bond rating.

Kellogg and other companies can finance with either debt or equity. Is one better than the other? If so, should firms be financed either with all debt or all equity? If the best solution is some mix of debt and equity, what is the optimal mix? As you read the chapter, think about these questions and consider how you would answer them.

Putting Things In Perspective

When we calculated the weighted average cost of capital (WACC) in Chapter 10 we assumed that the firm had a specific target capital structure. However, the target capital structure may change over time, such a change will affect the risk and cost of each type of capital, and all this can change the WACC. Moreover, a change in the WACC can affect capital budgeting decisions and, ultimately, the firm's stock price.

Many factors influence capital structure decisions, and, as we will see, determining the optimal capital structure is not an exact science. Therefore, even firms in the same industry often have dramatically different capital structures. In this chapter we consider the effects of debt on risk and thus on the optimal capital structure.



Two video clips of Steve Walsh, Assistant Treasurer at JCPenney, talking about capital structure are available at <http://fisher.osu.edu/fin/clips.htm>. The first clip on capital structure discusses the cost of capital and debt, while the second clip discusses the optimal capital structure as seen by JCPenney relative to the capital structure theory as seen by Modigliani/Miller.

14.1 THE TARGET CAPITAL STRUCTURE

A firm's **optimal capital structure** is defined as the structure that would maximize its stock price. It is useful to analyze the situation and seek to determine the optimal structure, but in practice it is difficult to estimate it with much confidence. As a result, in practice we tend to think of the optimal capital structure more as a range, say, from 40 to 50 percent debt, rather than as a precise number, say, 45 percent. Firms generally study the situation, reach a conclusion as to the optimal structure, and then set a **target capital structure**, perhaps a fixed number such as 45 percent debt. Then, if the actual debt ratio is below the target

Optimal Capital Structure

The firm's capital structure that maximizes its stock price.

Target Capital Structure

The mix of debt, preferred stock, and common equity with which the firm plans to raise capital.

level, they would raise capital by issuing debt, whereas if the debt ratio is above the target, equity would be used. The target may change over time as conditions change, but at any given moment, management generally has a specific structure in mind.

Setting the capital structure involves a trade-off between risk and return:

- Using more debt will raise the risk borne by stockholders.
- However, using more debt generally increases the expected return on equity.

The higher risk associated with more debt tends to lower the stock's price, but the higher debt-induced expected rate of return raises it. *Therefore, we seek to find the capital structure that strikes a balance between risk and return so as to maximize the stock price.*

Four primary factors influence capital structure decisions:

1. *Business risk*, or the riskiness inherent in the firm's operations if it used no debt. The greater the firm's business risk, the lower its optimal debt ratio.
2. The firm's *tax position*. A major reason for using debt is that interest is tax deductible, which lowers the effective cost of debt. However, if most of a firm's income is already sheltered from taxes by depreciation tax shields, interest on currently outstanding debt, or tax loss carry-forwards, its tax rate will be low, hence additional debt would not be as advantageous as it would be to a firm with a higher effective tax rate.
3. *Financial flexibility*, or the ability to raise capital on reasonable terms under adverse conditions. Corporate treasurers know that a steady supply of capital is necessary for stable operations, which is vital for long-run success. They also know that when money is tight in the economy, or when a firm is experiencing operating difficulties, it is easier to raise debt than equity capital, and lenders are more willing to accommodate companies with strong balance sheets. Therefore, the potential future need for funds and the consequences of a funds shortage influence the target capital structure—the greater the probability that capital will be needed, and the worse the consequences of not being able to obtain it, the less debt the firm should have on its balance sheet.
4. *Managerial conservatism or aggressiveness*. Some managers are more aggressive than others, hence they are more willing to use debt in an effort to boost profits. This factor does not affect the true optimal, or value-maximizing, capital structure, but it does influence the firm's target capital structure.

These four points largely determine the target capital structure, but operating conditions can cause the actual capital structure to vary from the target. For example, a company's actual stock price might for some reason be well below the intrinsic value as seen by management. In this case, management would be reluctant to issue new stock to raise capital, so it might use debt financing even though this caused the debt ratio to rise above the target level. Presumably, though, the company would take steps to return the capital structure to its target level as soon as the stock price approached its intrinsic value.



Define optimal capital structure and differentiate it from target capital structure.

What four factors influence the target capital structure?

In what sense does setting the target capital structure involve a trade-off between risk and return?

Why might market conditions cause a firm's actual capital structure to vary from its target?

14.2 BUSINESS AND FINANCIAL RISK

In Chapter 8, we examined risk from the viewpoint of an individual investor, and we distinguished between *risk on a stand-alone basis*, where an asset's cash flows are analyzed by themselves, and *risk in a portfolio context*, where the cash flows from a number of assets are combined and then the consolidated cash flows are analyzed. In a portfolio context, we saw that an asset's risk can be divided into two components: *diversifiable risk*, which can be diversified away and hence is of little concern to most investors, and *market risk*, which is measured by the beta coefficient and which reflects broad market movements that cannot be eliminated by diversification and therefore is of concern to all investors. Then, in Chapter 12, we examined risk from the viewpoint of the corporation, and we considered how capital budgeting decisions affect the firm's riskiness.

Now we introduce two new dimensions of risk:

1. *Business risk*, which is the riskiness of the firm's assets if it uses no debt.
2. *Financial risk*, which is the additional risk placed on the common stockholders as a result of using debt.

Business Risk

Business risk is perhaps the single most important determinant of capital structure. For firms with no debt, business risk can be measured by the variability in the projected return on assets (ROAs). Consider Bigbee Electronics Company, a *debt-free (unlevered)* firm. Because the company has no debt, its ROE is equal to its ROA, and either can be used to estimate business risk. Figure 14-1 gives some clues about the company's business risk. The top graph shows the trend in ROE from 1995 through 2005; this graph gives both security analysts and Bigbee's management an idea of the degree to which ROE has varied in the past and might vary in the future. The lower graph shows the beginning-of-year subjectively estimated probability distribution of Bigbee's ROE for 2005, based on the trend line in the top section of Figure 14-1. As the graphs indicate, Bigbee's actual ROE in 2005 (8 percent) fell below the expected value (12 percent).

Bigbee's past fluctuations in ROE were caused by many factors—booms and recessions in the national economy, successful new products introduced both by Bigbee and by its competitors, labor strikes, a fire in Bigbee's main plant, and so on. Similar events will doubtless occur in the future, and when they do, the realized ROE will be higher or lower than the projected level. Further, there is always the possibility that a long-term disaster will strike, permanently depressing the company's earning power. For example, a competitor might introduce a new product that would make Bigbee's products totally obsolete and put the company out of business. The more uncertainty there is about Bigbee's future ROE, the greater the company's *business risk*. Bigbee uses no debt, so its stockholders bear all of this risk.

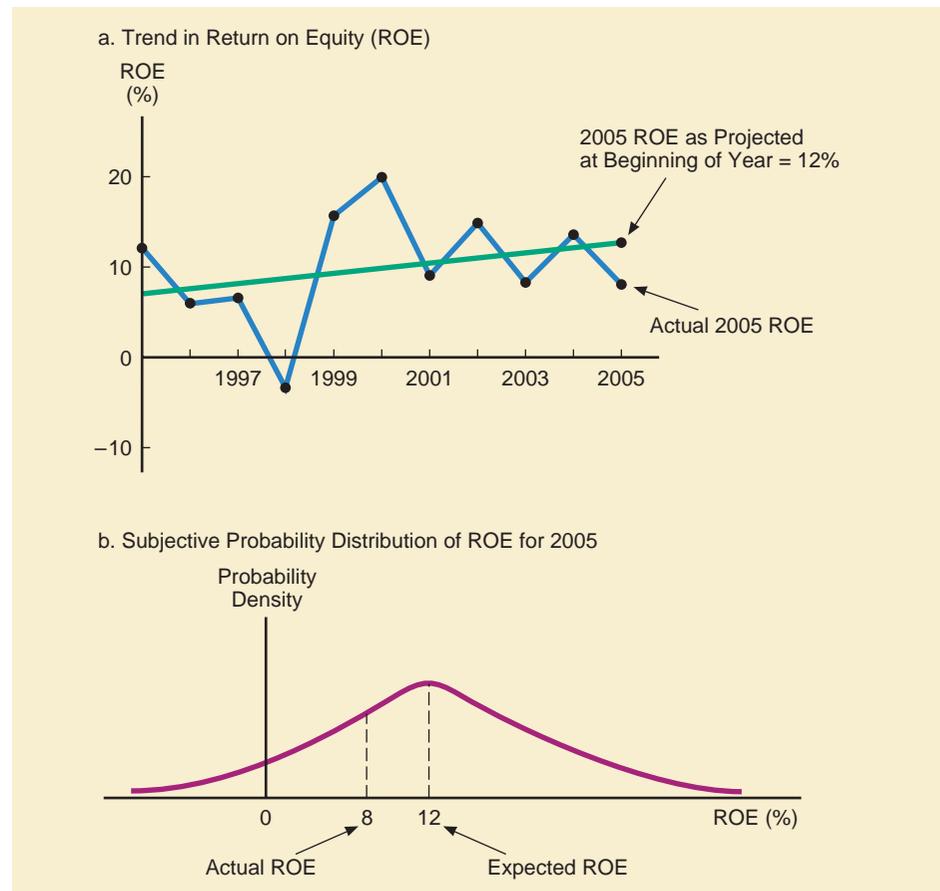
Business risk varies from industry to industry and also among firms in a given industry. Further, business risk can change over time. For example, the electric utilities were for many years regarded as having little business risk, but a combination of events in recent years altered the utilities' situation, producing sharp declines in their ROEs and greatly increasing the industry's risk. Today, food processors and health care firms are frequently given as examples of industries with low business risk, while cyclical manufacturing industries such as autos and steel, as well as many small startup companies, are regarded as having especially high business risks.¹

Business Risk

The riskiness inherent in the firm's operations if it uses no debt.

¹ We have avoided any discussion of market versus company-specific risk in this section. We note now (1) that any action that increases business risk in the stand-alone risk sense will generally also increase a firm's beta coefficient and (2) that a part of business risk as we define it will generally be company specific, hence subject to elimination by diversification by the firm's stockholders.

FIGURE 14-1 *Bigbee Electronics: Trend in ROE, 1995–2005, and Estimated Probability Distribution of ROE, 2005*



Business risk depends on a number of factors, the more important of which are listed here:

1. *Demand variability.* The more stable the demand for a firm's products, other things held constant, the lower its business risk.
2. *Sales price variability.* Firms whose products are sold in highly volatile markets are exposed to more business risk than similar firms whose output prices are more stable.
3. *Input cost variability.* Firms whose input costs are highly uncertain are exposed to a high degree of business risk.
4. *Ability to adjust output prices for changes in input costs.* Some firms are better able than others to raise their own output prices when input costs rise. The greater the ability to adjust output prices to reflect cost conditions, the lower the degree of business risk.
5. *Ability to develop new products in a timely, cost-effective manner.* Firms in such high-tech industries as drugs and computers depend on a constant stream of new products. The faster its products become obsolete, the greater a firm's business risk.
6. *Foreign risk exposure.* Firms that generate a high percentage of their earnings overseas are subject to earnings declines due to exchange rate fluctuations.

Also, if a firm operates in a politically unstable area, it may be subject to political risk.

7. *The extent to which costs are fixed: operating leverage.* If a high percentage of its costs are fixed, hence do not decline when demand falls, then the firm is exposed to a relatively high degree of business risk. This factor is called *operating leverage*, and it is discussed at length in the next section.

Each of these factors is determined partly by the firm's industry characteristics, but each of them is also controllable to some extent by management. For example, most firms can, through their marketing policies, take actions to stabilize both unit sales and sales prices. However, this stabilization may require spending a great deal on advertising and/or price concessions to obtain commitments from customers to purchase fixed quantities at fixed prices in the future. Similarly, firms such as Bigbee Electronics can reduce the volatility of future input costs by negotiating long-term labor and materials supply contracts, but they may have to pay prices above the current spot price to obtain these contracts. Many firms are also using hedging techniques to reduce business risk, as we discuss in Chapter 18.

Operating Leverage

As noted earlier, business risk depends in part on the extent to which a firm builds fixed costs into its operations—if fixed costs are high, even a small decline in sales can lead to a large decline in ROE. So, other things held constant, the higher a firm's fixed costs, the greater its business risk. Higher fixed costs are generally associated with more highly automated, capital intensive firms and industries. However, businesses that employ highly skilled workers who must be retained and paid even during recessions also have relatively high fixed costs, as do firms with high product development costs, because the amortization of development costs is an element of fixed costs.

If a high percentage of total costs are fixed, then the firm is said to have a high degree of **operating leverage**. In physics, leverage implies the use of a lever to raise a heavy object with a small force. In politics, if people have leverage, their smallest word or action can accomplish a lot. *In business terminology, a high degree of operating leverage, other factors held constant, implies that a relatively small change in sales results in a large change in ROE.*

Figure 14-2 illustrates the concept of operating leverage by comparing the results that Bigbee could expect if it used different degrees of operating leverage. Plan A calls for a relatively small amount of fixed costs, \$20,000. Here the firm would not have much automated equipment, so its depreciation, maintenance, property taxes, and so on would be low. However, the total operating costs line has a relatively steep slope, indicating that variable costs per unit are higher than they would be if the firm used more operating leverage. Plan B calls for a higher level of fixed costs, \$60,000. Here the firm uses automated equipment (with which one operator can turn out a few or many units at the same labor cost) to a much larger extent. The breakeven point is higher under Plan B—breakeven occurs at 60,000 units under Plan B versus only 40,000 units under Plan A.

We can calculate the breakeven quantity by recognizing that **operating breakeven** occurs when $ROE = 0$, hence when earnings before interest and taxes ($EBIT$) = 0:²

$$EBIT = PQ - VQ - F = 0 \quad (14-1)$$

² This definition of breakeven does not include any fixed financial costs because Bigbee is an unlevered firm. If there were fixed financial costs, the firm would suffer an accounting loss at the operating breakeven point. We will introduce financial costs shortly.

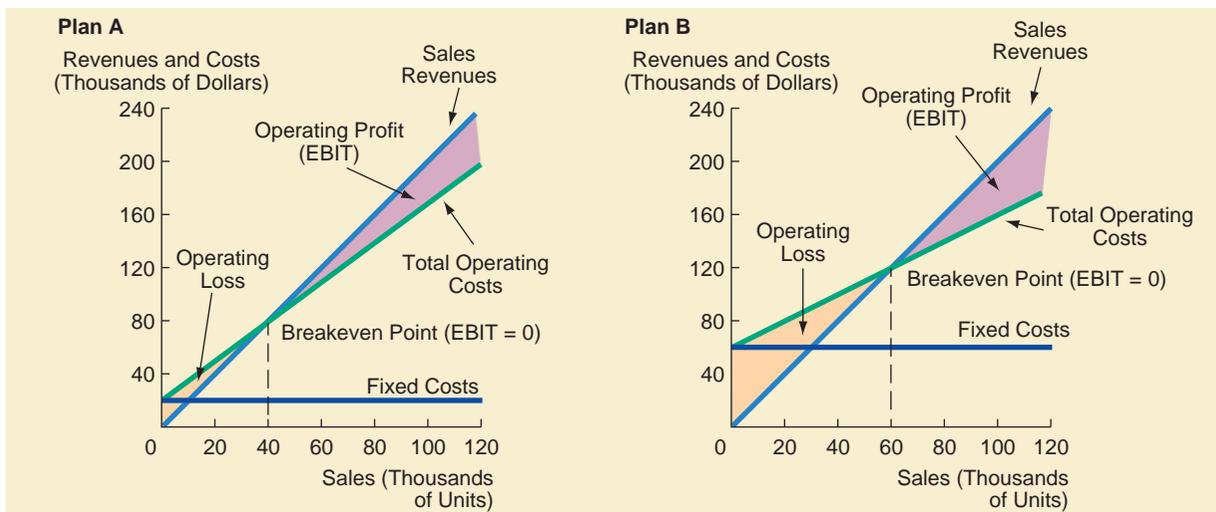
Operating Leverage

The extent to which fixed costs are used in a firm's operations.

Operating Breakeven

The output quantity at which $EBIT = 0$.

FIGURE 14-2 Illustration of Operating Leverage



	Plan A	Plan B
Price	\$2.00	\$2.00
Variable costs	\$1.50	\$1.00
Fixed costs	\$20,000	\$60,000
Assets	\$200,000	\$200,000
Tax rate	40%	40%

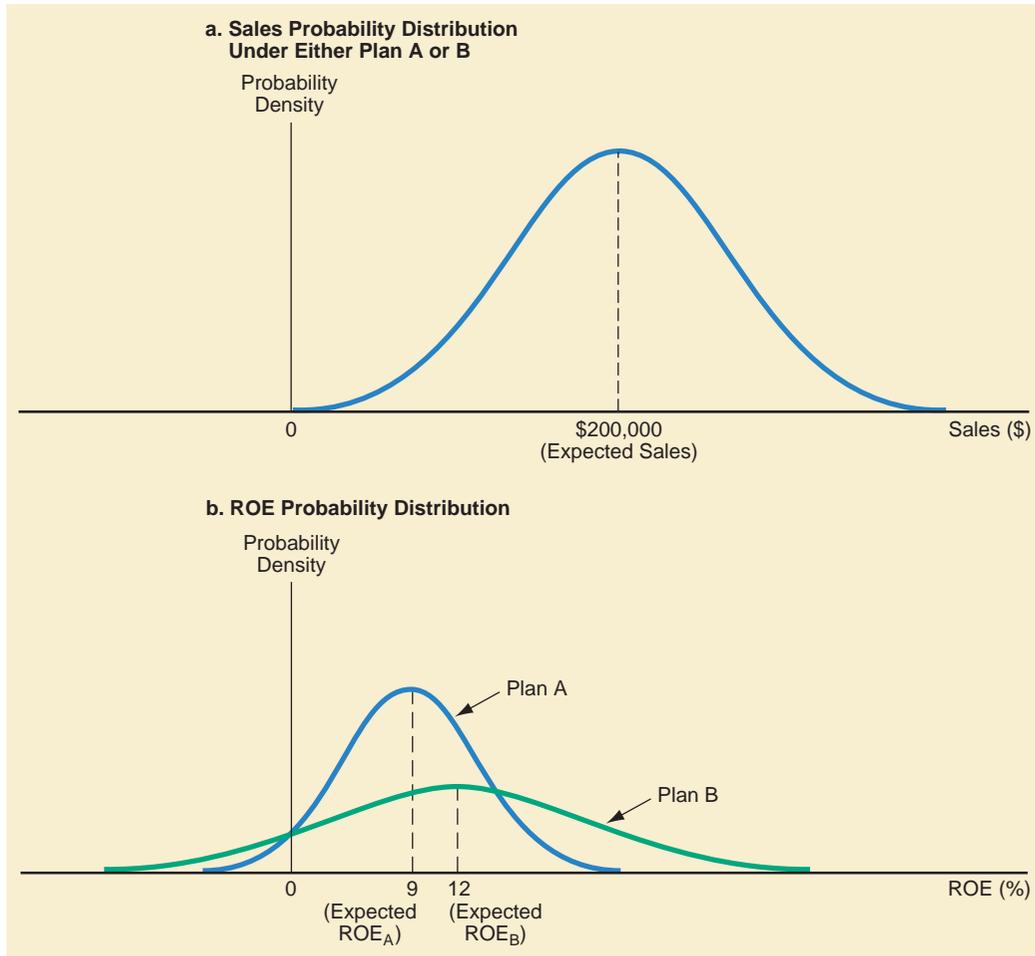
Demand	Probabil- ity	Units Sold	Dollar Sales	PLAN A				PLAN B			
				Oper- ating Costs	Operating Profits (EBIT)	Net Income	ROE	Oper- ating Costs	Operating Profits (EBIT)	Net Income	ROE
Terrible	0.05	0	\$ 0	\$ 20,000	(\$20,000)	(\$12,000)	(6.00)%	\$ 60,000	(\$ 60,000)	(\$36,000)	(18.00)%
Poor	0.20	40,000	80,000	80,000	0	0	0.00	100,000	(20,000)	(12,000)	(6.00)
Normal	0.50	100,000	200,000	170,000	30,000	18,000	9.00	160,000	40,000	24,000	12.00
Good	0.20	160,000	320,000	260,000	60,000	36,000	18.00	220,000	100,000	60,000	30.00
Wonderful	0.05	200,000	400,000	320,000	80,000	48,000	24.00	260,000	140,000	84,000	42.00
Expected value:		100,000	\$200,000	\$170,000	\$30,000	\$18,000	9.00%	\$160,000	\$ 40,000	\$24,000	12.00%
Standard deviation:					\$24,698		7.41%		\$ 49,396		14.82%
Coefficient of variation:					0.82		0.82		1.23		1.23

- Notes: a. Operating costs = Variable costs + Fixed costs.
 b. The federal-plus-state tax rate is 40 percent, so NI = EBIT(1 - Tax rate) = EBIT(0.6).
 c. ROE = NI/Equity. The firm has no debt, so Assets = Equity = \$200,000.
 d. The breakeven sales level for Plan B is not shown in the table, but it is 60,000 units or \$120,000.
 e. The expected values, standard deviations, and coefficients of variation were found using the procedures discussed in Chapter 8.

Here P is average sales price per unit of output, Q is units of output, V is variable cost per unit, and F is fixed operating costs. If we solve for the breakeven quantity, Q_{BE} , we get this expression:

$$Q_{BE} = \frac{F}{P - V} \tag{14-1a}$$

FIGURE 14-3 Analysis of Business Risk



Note: We are using continuous distributions to approximate the discrete distributions contained in Figure 14-2.

Thus for Plan A,

$$Q_{BE} = \frac{\$20,000}{\$2.00 - \$1.50} = 40,000 \text{ units}$$

and for Plan B,

$$Q_{BE} = \frac{\$60,000}{\$2.00 - \$1.00} = 60,000 \text{ units}$$

How does operating leverage affect business risk? *Other things held constant, the higher a firm's operating leverage, the higher its business risk.* This point is demonstrated in Figure 14-3, where we develop probability distributions for ROE under Plans A and B.

The top section of Figure 14-3 graphs the probability distribution of sales that was presented in tabular form in Figure 14-2. The sales probability

distribution depends on how demand for the product varies, not on whether the product is manufactured by Plan A or by Plan B. Therefore, the same sales probability distribution applies to both production plans; this distribution has expected sales of \$200,000, and it ranges from zero to about \$400,000, with a standard deviation of $\sigma_{\text{Sales}} = \$98,793$.

We use the sales probability distribution, together with the operating costs at each sales level, to develop graphs of the ROE probability distributions under Plans A and B. These are shown in the bottom section of Figure 14-3. Plan B has a higher expected ROE, but this plan also entails a much higher probability of losses. Clearly, Plan B, the one with more fixed costs and a higher degree of operating leverage, is riskier. *In general, holding other factors constant, the higher the degree of operating leverage, the greater the firm's business risk.* In the discussion that follows, we assume that Bigbee has decided to go ahead with Plan B because management believes that the higher expected return is sufficient to compensate for the higher risk.

To what extent can firms control their operating leverage? To a large extent, operating leverage is determined by technology. Electric utilities, telephone companies, airlines, steel mills, and chemical companies simply *must* have large investments in fixed assets; this results in high fixed costs and operating leverage. Similarly, drug, auto, computer, and other companies must spend heavily to develop new products, and product-development costs increase operating leverage. Grocery stores, on the other hand, generally have significantly lower fixed costs, hence lower operating leverage. Still, although industry factors do exert a major influence, all firms have some control over their operating leverage. For example, an electric utility can expand its generating capacity by building either gas-fired or coal-fired plants. Coal plants would require a larger investment and would have higher fixed costs, but their variable operating costs would be relatively low. Gas-fired plants, on the other hand, would require a smaller investment and would have lower fixed costs, but the variable costs (for gas) would be high. Thus, by its capital budgeting decisions, a utility (or any other company) can influence its operating leverage, hence its business risk.

The concept of operating leverage was originally developed for use in capital budgeting. Mutually exclusive projects that involve alternative methods for producing a given product often have different degrees of operating leverage, hence different breakeven points and different degrees of risk. Bigbee Electronics and many other companies regularly undertake a type of breakeven analysis (the sensitivity analysis discussed in Chapter 12) for each proposed project as a part of their regular capital budgeting process. Still, once a corporation's operating leverage has been established, this factor exerts a major influence on its capital structure decision.

Financial Risk

Financial Risk

An increase in stockholders' risk, over and above the firm's basic business risk, resulting from the use of financial leverage.

Financial risk is the additional risk placed on the common stockholders as a result of the decision to finance with debt. Conceptually, stockholders face a certain amount of risk that is inherent in the firm's operations—this is its business risk, defined as the uncertainty inherent in projections of future operating income. If a firm uses debt (financial leverage), this concentrates the business risk on common stockholders. To illustrate, suppose 10 people decide to form a corporation to build houses. There is a certain amount of business risk in the operation. If the firm is capitalized only with common equity, and if each person buys 10 percent of the stock, then each investor shares equally in the business risk. However, suppose the firm is capitalized with 50 percent debt and 50 percent equity, with five of the investors putting up their capital as debt and the other five putting up their money as equity. The debtholders will receive a fixed payment,

and it will come before the stockholders receive anything. Also, if the firm goes bankrupt, the debtholders must be paid off before the stockholders get anything. In this case, the five investors who put up the equity will have to bear all of the business risk, so the common stock will be twice as risky as it would have been had the firm been financed only with equity. Thus, the use of debt, or **financial leverage**, concentrates the firm's business risk on the stockholders. (In Web Appendix 14A, we describe in more detail the interaction between operating leverage and financial leverage.)

To illustrate the business risk concentration, we can extend the Bigbee Electronics example. To date, the company has never used debt, but the treasurer is now considering a possible change in its capital structure. Changes in the use of debt would cause changes in earnings per share (EPS) as well as changes in risk—both of which would affect the stock price. To understand the relationship between financial leverage and EPS, first consider Table 14-1, which shows how Bigbee's cost of debt would vary if it used different amounts of debt to finance a fixed amount of assets. The higher the percentage of debt in the capital structure, the riskier the debt, hence the higher the interest rate lenders will charge.

For now, assume that only two financing choices are being considered—remain at 100 percent equity, or shift to 50 percent debt and 50 percent equity. We also assume that with no debt Bigbee has 10,000 shares of common stock outstanding and, if it decides to change its capital structure, common stock can be repurchased at the \$20 current stock price. Now consider Table 14-2, which shows how the financing choice will affect Bigbee's profitability and risk.

First, focus on Section I, which assumes that Bigbee uses no debt. Because debt is zero, interest is also zero, hence pre-tax income is equal to EBIT. Taxes at 40 percent are deducted to obtain net income, which is then divided by the \$200,000 of equity to calculate ROE. Note that Bigbee receives a tax credit if net income is negative (when demand is terrible or poor). Here we assume that Bigbee's losses can be carried back to offset income earned in the prior year. The ROE at each sales level is then multiplied by the probability of that sales level to calculate the 12 percent expected ROE. Note that this 12 percent is the same as we found in Figure 14-2 for Plan B.

Section I of the table also calculates Bigbee's earnings per share (EPS) for each scenario under the assumption that the company continues to use no debt. Net income is divided by the 10,000 common shares outstanding to obtain EPS. If demand is terrible, the EPS will be $-\$3.60$, but if demand is wonderful, the EPS will rise to $\$8.40$. The EPS at each sales level is then multiplied by the probability of that level to calculate the expected EPS, which is $\$2.40$ if Bigbee uses

Financial Leverage

The extent to which fixed-income securities (debt and preferred stock) are used in a firm's capital structure.

TABLE 14-1 Interest Rates for Bigbee with Different Debt/Assets Ratios

Amount Borrowed ^a	Debt/Assets Ratio	Interest Rate, r_d , on All Debt
\$20,000	10%	8.0%
40,000	20	8.3
60,000	30	9.0
80,000	40	10.0
100,000	50	12.0
120,000	60	15.0

^a We assume that the firm must borrow in increments of \$20,000. We also assume that Bigbee is unable to borrow more than \$120,000, which is 60 percent of its \$200,000 of assets, due to restrictions in its corporate charter.

TABLE 14-2 *Effects of Financial Leverage: Bigbee Electronics Financed with Zero Debt or 50 Percent Debt*
SECTION I. ZERO DEBT

Debt ratio	0%
Assets	\$200,000
Debt	\$ 0
Equity	\$200,000
Shares outstanding	10,000

Demand for Product (1)	Probability (2)	EBIT (3)	Interest (4)	Pre-Tax Income (5)	Taxes (40%) (6)	Net Income (7)	ROE (8)	EPS ^a (9)
Terrible	0.05	(\$ 60,000)	\$0	(\$ 60,000)	(\$24,000)	(\$36,000)	(18.00)%	(\$3.60)
Poor	0.20	(20,000)	0	(20,000)	(8,000)	(12,000)	(6.00)	(1.20)
Normal	0.50	40,000	0	40,000	16,000	24,000	12.00	2.40
Good	0.20	100,000	0	100,000	40,000	60,000	30.00	6.00
Wonderful	0.05	140,000	0	140,000	56,000	84,000	42.00	8.40
Expected value:		\$ 40,000	\$0	\$ 40,000	\$16,000	\$24,000	12.00%	\$2.40
Standard deviation:							14.82%	\$2.96
Coefficient of variation:							1.23	1.23

- Assumptions:
- In terms of its operating leverage, Bigbee has chosen Plan B. The probability distribution and EBIT are obtained from Figure 14-2.
 - Sales and operating costs, hence EBIT, are not affected by the financing decision. Therefore, EBIT under both financing plans is identical, and it is taken from the EBIT column for Plan B in Figure 14-2.
 - All losses can be carried back to offset income in the prior year.

^a The EPS figures can also be obtained using the following formula, in which the numerator amounts to an income statement at a given sales level laid out horizontally:

$$\text{EPS} = \frac{(\text{Sales} - \text{Fixed costs} - \text{Variable costs} - \text{Interest})(1 - \text{Tax rate})}{\text{Shares outstanding}} = \frac{(\text{EBIT} - I)(1 - T)}{\text{Shares outstanding}} \quad (\text{note continued})$$

no debt. We also calculate the standard deviation of EPS and the coefficient of variation as indicators of the firm's risk at a zero debt ratio: $\sigma_{\text{EPS}} = \$2.96$, and $\text{CV}_{\text{EPS}} = 1.23$.

Now look at the situation if Bigbee decides to use 50 percent debt financing, shown in Section II, with the interest rate on debt at 12 percent. Sales will not be affected, nor will operating costs, hence the EBIT columns are the same for the zero debt and 50 percent debt cases. However, the company will now have \$100,000 of debt with a cost of 12 percent, hence its interest expense will be \$12,000. This interest must be paid regardless of the state of the economy—if it is not paid, the company will be forced into bankruptcy, and stockholders will probably be wiped out. Therefore, we show a \$12,000 cost in Column 4 as a fixed number for all sales levels. Column 5 shows pre-tax income, Column 6 the applicable taxes, and Column 7 the resulting net income. When the net income figures are divided by the equity investment—which now will be only \$100,000 because \$100,000 of the \$200,000 total requirement was obtained as debt—we find the ROE under each demand state. If demand is terrible and sales are zero, then a very large loss will be incurred, and the ROE will be -43.2 percent. However, if demand is wonderful, then ROE will be 76.8 percent. The expected ROE is the probability-weighted average, which is 16.8 percent if the company uses 50 percent debt.

TABLE 14-2 *continued*

SECTION II. 50% DEBT

Debt ratio	50.00%
Assets	\$200,000
Debt	\$100,000
Interest rate	12.00%
Equity	\$100,000
Shares outstanding	5,000

Demand for Product (1)	Probability (2)	EBIT (3)	Interest (4)	Pre-Tax Income (5)	Taxes (40%) (6)	Net Income (7)	ROE (8)	EPS ^a (9)
Terrible	0.05	(\$ 60,000)	\$12,000	(\$ 72,000)	(\$28,800)	(\$43,200)	(43.20)%	(\$ 8.64)
Poor	0.20	(20,000)	12,000	(32,000)	(12,800)	(19,200)	(19.20)	(3.84)
Normal	0.50	40,000	12,000	28,000	11,200	16,800	16.80	3.36
Good	0.20	100,000	12,000	88,000	35,200	52,800	52.80	10.56
Wonderful	0.05	140,000	12,000	128,000	51,200	76,800	76.80	15.36
Expected value:		\$ 40,000	\$12,000	\$ 28,000	\$11,200	\$16,800	16.80%	\$ 3.36
Standard deviation:							29.64%	5.93
Coefficient of variation:							1.76	1.76

For example, with zero debt and Sales = \$200,000, EPS is \$2.40:

$$EPS_{D/A=0} = \frac{(\$200,000 - \$60,000 - \$100,000 - 0)(0.6)}{10,000} = \$2.40$$

With 50% percent debt and Sales = \$200,000, EPS is \$3.36:

$$EPS_{D/A=0.5} = \frac{(\$200,000 - \$60,000 - \$100,000 - \$12,000)(0.6)}{5,000} = \$3.36$$

Refer to the tabular data given in Figure 14-2 to arrive at sales, fixed costs, and variable costs that are used in these equations.

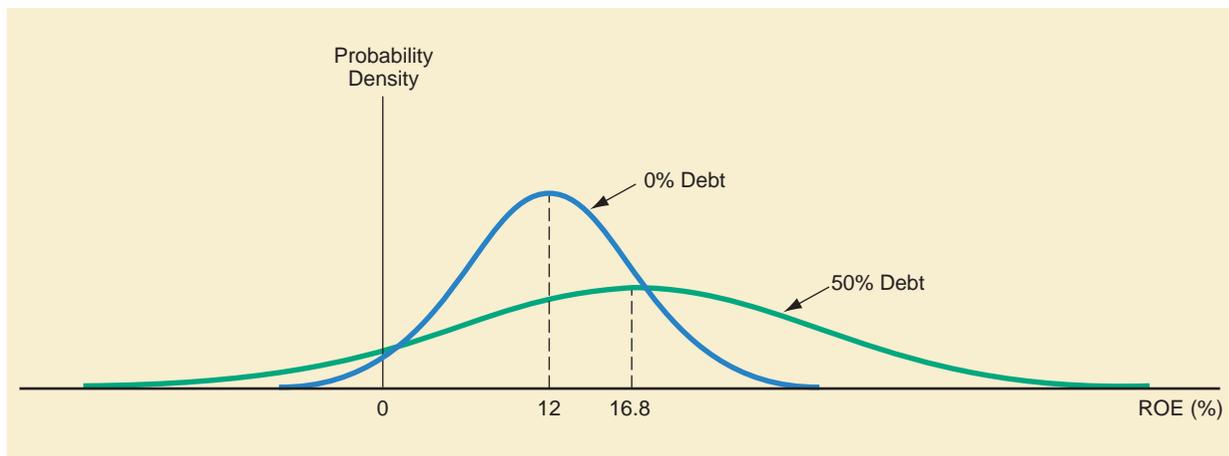
Typically, financing with debt increases the expected rate of return for an investment, but debt also increases risk to the firm's owners, its common stockholders. This situation holds with our example—financial leverage raises the expected ROE from 12 to 16.8 percent, but it also increases the risk of the investment as measured by the coefficient of variation from 1.23 to 1.76.

Figure 14-4 graphs the data in Table 14-2. It shows in another way that using financial leverage increases the expected ROE but that leverage also flattens out the probability distribution, increases the probability of a large loss, and thus increases the risk borne by stockholders.

We can also calculate Bigbee's EPS if it is financed with 50 percent debt. With Debt = \$0, there would be 10,000 shares outstanding, but if half of the equity were replaced by debt (Debt = \$100,000), there would be only 5,000 shares outstanding. We must therefore determine the EPS that would result at each of the possible demand levels under the different capital structures.³ With no debt, EPS would

³ We assume in this example that the firm could change its capital structure by repurchasing common stock at its book value of \$100,000/5,000 shares = \$20 per share. However, the firm may actually have to pay a higher price to repurchase its stock on the open market. If Bigbee had to pay \$22 per share, then it could repurchase only \$100,000/\$22 = 4,545 shares, and, in this case, expected EPS would be only \$16,800/(10,000 - 4,545) = \$16,800/5,455 = \$3.08 rather than \$3.36.

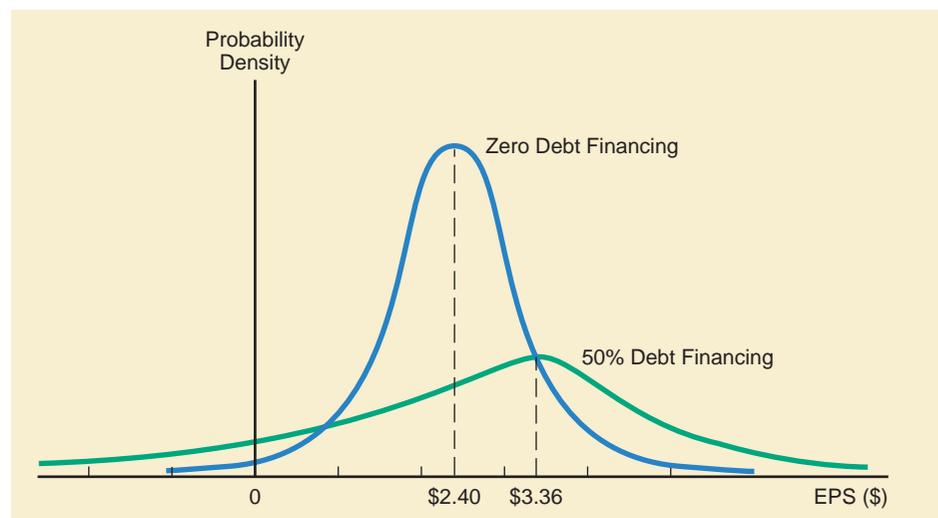
FIGURE 14-4 *ROE Probability Distributions for Bigbee Electronics, with and without Leverage*



be $-\$3.60$ if demand were terrible; $\$2.40$ if demand were normal; and $\$8.40$ if demand were wonderful. With 50 percent debt, EPS would be $-\$8.64$ if demand were terrible; $\$3.36$ if demand were normal; and $\$15.36$ if demand were wonderful. Expected EPS would be $\$2.40$ with no debt but $\$3.36$ with 50 percent financial leverage.

The EPS distributions under the two financial structures are graphed in Figure 14-5, where we use continuous distributions rather than the discrete distributions contained in Table 14-2. Although expected EPS would be much higher if financial leverage were employed, the graph makes it clear that the risk of low, or even negative, EPS would also be higher if debt were used.

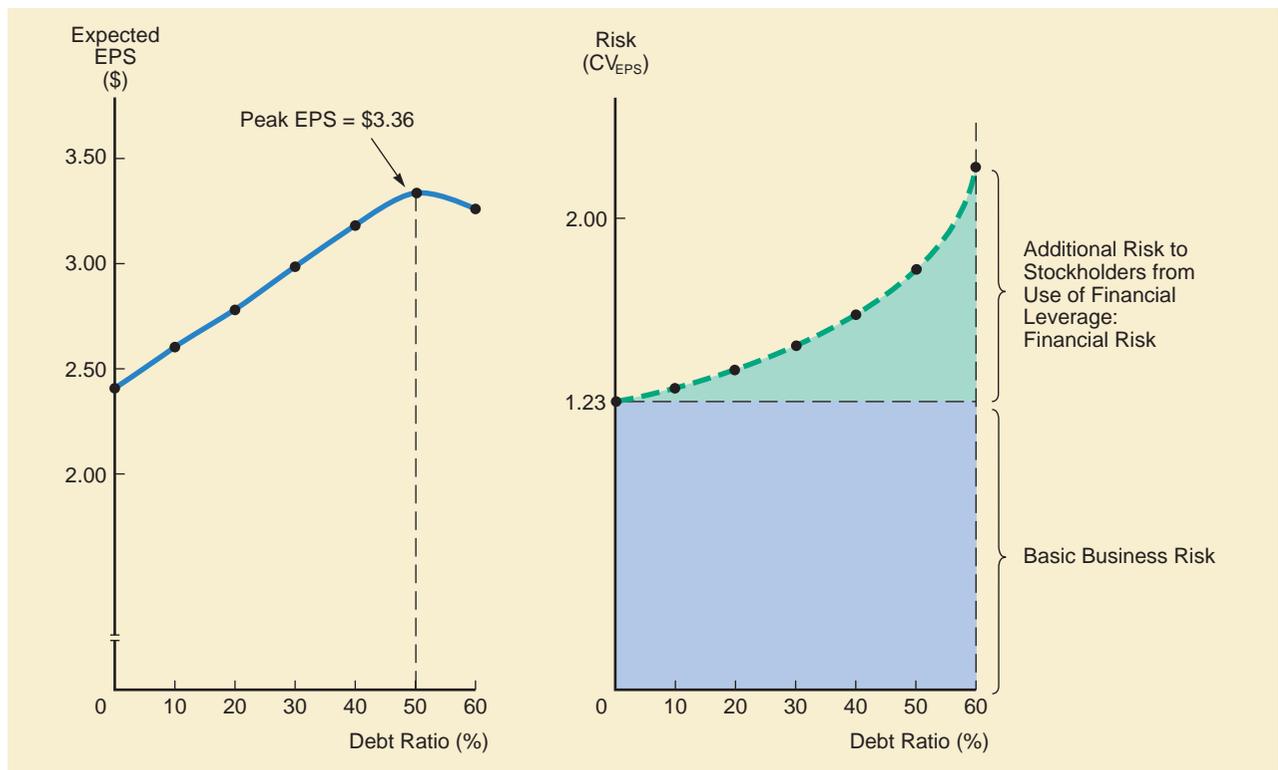
FIGURE 14-5 *Probability Distributions of EPS with Different Amounts of Financial Leverage*



Another view of the relationships among expected EPS, risk, and financial leverage is presented in Figure 14-6. The tabular data in the lower section were calculated in the manner set forth in Table 14-2, and the graphs plot these data. Here we see that expected EPS rises until the firm is financed with 50 percent debt. Interest charges rise, but this effect is more than offset by the declining number of shares outstanding as debt is substituted for equity. However, EPS peaks at a debt ratio of 50 percent, beyond which interest rates rise so rapidly that EPS falls in spite of the falling number of shares outstanding.

The right panel of Figure 14-6 shows that risk, as measured by the coefficient of variation of EPS, rises continuously, and at an increasing rate, as debt is substituted for equity.

FIGURE 14-6 Relationships among Expected EPS, Risk, and Financial Leverage



Debt Ratio	Expected EPS	Standard Deviation of EPS	Coefficient of Variation
0% ^a	\$2.40 ^a	\$2.96 ^a	1.23 ^a
10	2.56	3.29	1.29
20	2.75	3.70	1.35
30	2.97	4.23	1.43
40	3.20	4.94	1.54
50 ^a	3.36 ^a	5.93 ^a	1.76 ^a
60	3.30	7.41	2.25

^a Values for debt ratios = 0% and 50% are taken from Table 14-2. Values at other debt ratios were calculated similarly.

These examples make it clear that using leverage has both positive and negative effects: higher leverage increases expected EPS (in this example, until the debt ratio equals 50 percent), but it also increases risk. When determining its optimal capital structure, Bigbee needs to balance these positive and negative effects of leverage. This issue is discussed in the following sections.



What is business risk, and how can it be measured?

What are some determinants of business risk?

Why does business risk vary from industry to industry?

What is operating leverage?

How does operating leverage affect business risk?

What is financial risk, and how does it arise?

Explain this statement: "Using leverage has both good and bad effects."

14.3 DETERMINING THE OPTIMAL CAPITAL STRUCTURE

As we saw in Figure 14-6, Bigbee's expected EPS is maximized at a debt ratio of 50 percent. Does that mean that Bigbee's optimal capital structure calls for 50 percent debt? The answer is a resounding no—the *optimal capital structure is the one that maximizes the price of the firm's stock, and this generally calls for a debt ratio that is lower than the one that maximizes expected EPS.*

Recall from Chapter 9 that stock prices are positively related to expected dividends but negatively related to the required return on equity. Firms with higher earnings are able to pay higher dividends, so to the extent that higher debt levels raise expected EPS, leverage works to increase the stock price. However, higher debt levels also increase the firm's risk, and that raises the cost of equity and works to reduce the stock price. So, even though increasing the debt ratio from 40 to 50 percent raises EPS, the higher EPS is more than offset by the corresponding increase in risk.

WACC and Capital Structure Changes

Managers should set as the target the capital structure that maximizes the firm's stock price. However, it is difficult to estimate how a given change in the capital structure will affect the stock price. As it turns out, the capital structure that maximizes the stock price also minimizes the WACC, and at times it is easier to predict how a capital structure change will affect the WACC than the stock price. Therefore, many managers use the estimated relationship between capital structure and the WACC to guide their capital structure decisions.

Recall from Chapter 10 that when there is no preferred stock in a firm's capital structure, the WACC is defined as follows:

$$\begin{aligned} \text{WACC} &= w_d(r_d)(1 - T) + w_c(r_s) \\ &= (D/A)(r_d)(1 - T) + (E/A)(r_s) \end{aligned}$$

In this expression, D/A and E/A represent the debt-to-assets and equity-to-assets ratios, and they sum to 1.0.

TABLE 14-3 Bigbee's Stock Price and WACC Estimates with Different Debt/Assets Ratios

Debt/ Assets (1)	Debt/ Equity ^a (2)	AT r_d (3)	Expected EPS (and DPS) ^b (4)	Estimated Beta ^c (5)	$r_s = [r_{RF} +$ (RP_M) $b]$ ^d (6)	Estimated Price ^e (7)	Resulting P/E Ratio (8)	WACC ^f (9)
0%	0.00%	4.8%	\$2.40	1.50	12.0%	\$20.00	8.33×	12.00%
10	11.11	4.8	2.56	1.60	12.4	20.65	8.06	11.64
20	25.00	5.0	2.75	1.73	12.9	21.33	7.75	11.32
30	42.86	5.4	2.97	1.89	13.5	21.90	7.38	11.10
40	66.67	6.0	3.20	2.10	14.4	22.22	6.94	11.04
50	100.00	7.2	3.36	2.40	15.6	21.54	6.41	11.40
60	150.00	9.0	3.30	2.85	17.4	18.97	5.75	12.36

$$^a D/E = \frac{D/A}{1 - D/A}$$

^b Bigbee pays all of its earnings out as dividends, so EPS = DPS.

^c The firm's unlevered beta, b_U , is 1.5. The remaining betas were calculated using the Hamada equation, given the unlevered beta, tax rate, and D/E ratio as inputs.

^d We assume that $r_{RF} = 6\%$ and $RP_M = 4\%$. Therefore, at $D/A = 0$, $r_s = 6\% + (4\%)1.5 = 12\%$. Other values of r_s are calculated similarly.

^e Since all earnings are paid out as dividends, no retained earnings will be plowed back into the business, and growth in EPS and DPS will be zero. Hence, the zero growth stock price model developed in Chapter 9 can be used to estimate the price of Bigbee's stock. For example, at $D/A = 0$,

$$P_0 = \frac{DPS}{r_s} = \frac{\$2.40}{0.12} = \$20$$

Other prices were calculated similarly.

^f Column 9 is found by use of the WACC equation developed in Chapter 10:

$$\begin{aligned} WACC &= w_d r_d (1 - T) + w_e r_s \\ &= (D/A)(r_d)(1 - T) + (1 - D/A)r_s \end{aligned}$$

For example, at $D/A = 40\%$,

$$WACC = 0.4(10\%)(0.6) + 0.6(14.4\%) = 11.04\%$$

We use book weights here, but market value weights would be theoretically better. See Eugene F. Brigham and Phillip R. Daves, *Intermediate Financial Management*, 8th ed. (Mason, OH: Thomson/South-Western, 2004), Chapter 9, for a discussion of this point.

Note that in Table 14-3 an increase in the debt ratio raises the costs of both debt and equity. [The cost of debt, r_d , is taken from Table 14-1, but multiplied by $(1 - T)$ to put it on an after-tax basis.] Bondholders recognize that if a firm has a higher debt ratio, this increases the risk of financial distress, and this increase in risk leads to higher interest rates.

In practice, financial managers use financial statement forecasting models to determine how changes in the debt ratio will affect the current ratio, times-interest-earned ratio, and EBITDA coverage ratio.⁴ They then discuss their pro forma financial statements with bankers and bond rating agencies, who ask probing questions and may make their own adjustments to the firm's forecasts. The bankers and rating agencies then compare the firm's ratios with those of other firms in its industry, and arrive at a "what if" rating and corresponding

⁴ We discuss financial statement forecasts in Chapter 17.

interest rate. Moreover, if the company plans to issue bonds to the public, the SEC requires that it inform investors what the coverages will be after the new bonds have been sold. Recognizing all this, sophisticated financial managers use their forecasted ratios to predict how bankers and other lenders will judge their firms' risks and thus determine their costs of debt. Thus, they can judge quite accurately the effects of capital structure on the cost of debt.

The Hamada Equation

Increasing the debt ratio increases the risks faced by bondholders and thus increases the cost of debt. More debt also raises the risk borne by stockholders, and that raises the cost of equity, r_s . It is harder to quantify leverage's effects on the cost of equity, but a theoretical formula can help measure the effect.

To begin, recall from Chapter 8 that a stock's beta is the relevant measure of risk for a diversified investor. Moreover, beta increases with financial leverage, and Robert Hamada formulated the following equation to quantify this effect.⁵

$$b_L = b_U[1 + (1 - T)(D/E)] \quad (14-2)$$

Here b_L is the firm's actual, current beta, which presumably is based on the existence of some financial leverage, and b_U is the beta the firm would have if it were debt free, or unlevered. If the firm were debt free, then beta would depend entirely on business risk and thus be a measure of the firm's "basic business risk." D/E is the measure of financial leverage as used in the Hamada equation, and T is the corporate tax rate.⁶

Now recall the CAPM version of the cost of equity:

$$r_s = r_{RF} + (RP_M)b_i$$

Note that beta is the only variable in the equity cost equation that is under management's control—the other two variables, r_{RF} and RP_M , are determined by market forces that are beyond the firm's control, but b_L is determined by the firm's operating decisions as discussed earlier in the chapter, which affect its basic business risk, and by the firm's capital structure decisions as reflected in its D/A (or D/E) ratio.

We can solve Equation 14-2 to find the **unlevered beta**, b_U , obtaining Equation 14-2a:

$$b_U = b_L/[1 + (1 - T)(D/E)] \quad (14-2a)$$

⁵ See Robert S. Hamada, "Portfolio Analysis, Market Equilibrium, and Corporation Finance," *Journal of Finance*, March 1969, pp. 13–31. See Eugene F. Brigham and Phillip R. Daves, *Intermediate Financial Management*, 8th ed. (Mason, OH: Thomson/South-Western, 2004), Chapter 14, for further discussion of the Hamada equation.

⁶ Recall from Chapter 4 that the debt/equity ratio, D/E , is directly related to the D/A ratio:

$$\frac{D}{E} = \frac{D/A}{1 - D/A}$$

For example, if the firm has \$40 of debt and \$60 of equity, then $D/A = 0.4$, $E/A = 0.6$, and

$$\frac{D}{E} = \frac{0.4}{1 - 0.4} = 0.4/0.6 = 0.6667$$

Thus any D/A ratio can be directly translated into a D/E ratio. Note also that Hamada's equation assumes that assets are reported at market values rather than accounting book values. This point is discussed at length in Brigham and Daves, *Intermediate Financial Management*, where the feedbacks among capital structure, stock prices, and capital costs are examined.

Unlevered Beta, b_U
The firm's beta coefficient if it has no debt.

The current (levered) beta is known, as are the tax rate and the debt/equity ratio, so we can insert values for these known variables to find the unlevered beta. The unlevered beta can then be used in Equation 14-2, with different debt levels, to find the levered betas that would exist with different debt levels. Those betas can then be used to find the cost of equity with different amounts of debt.

We can illustrate the procedure with Bigbee Electronics. First, assume that the risk-free rate of return, r_{RF} , is 6 percent, and that the market risk premium, RP_M , is 4 percent. Next, we need the unlevered beta, b_U . Because Bigbee has no debt, its $D/E = 0$. Therefore, its current 1.5 beta is also its unlevered beta, hence $b_U = 1.5$. With b_U , r_{RF} , and RP_M specified, we can use Equation 14-2 to estimate Bigbee's betas at different degrees of financial leverage, and then its cost of equity at those debt ratios.

Bigbee's betas at different debt/equity ratios are shown in Column 5 of Table 14-3. The current cost of equity is 12 percent as shown at the top of Column 6:

$$\begin{aligned} r_s &= r_{RF} + \text{Risk premium} \\ &= 6\% + (4\%)(1.5) \\ &= 6\% + 6\% = 12\% \end{aligned}$$

The first 6 percent is the risk-free rate, the second is the firm's risk premium. Because Bigbee currently uses no debt, it has no financial risk. Therefore, the 6 percent risk premium is entirely attributable to business risk.

If Bigbee changes its capital structure by adding debt, this would increase the risk stockholders would have to bear. That, in turn, would result in a higher risk premium. Conceptually, this situation would exist:

$$r_s = r_{RF} + \text{Premium for business risk} + \text{Premium for financial risk}$$

Figure 14-7, which is based on data shown in Column 6 of Table 14-3, graphs Bigbee's cost of equity at different debt ratios. As the figure shows, r_s consists of the 6 percent risk-free rate, a constant 6 percent premium for business risk, and a premium for financial risk that starts at zero but rises at an increasing rate as the debt ratio increases.

The Optimal Capital Structure

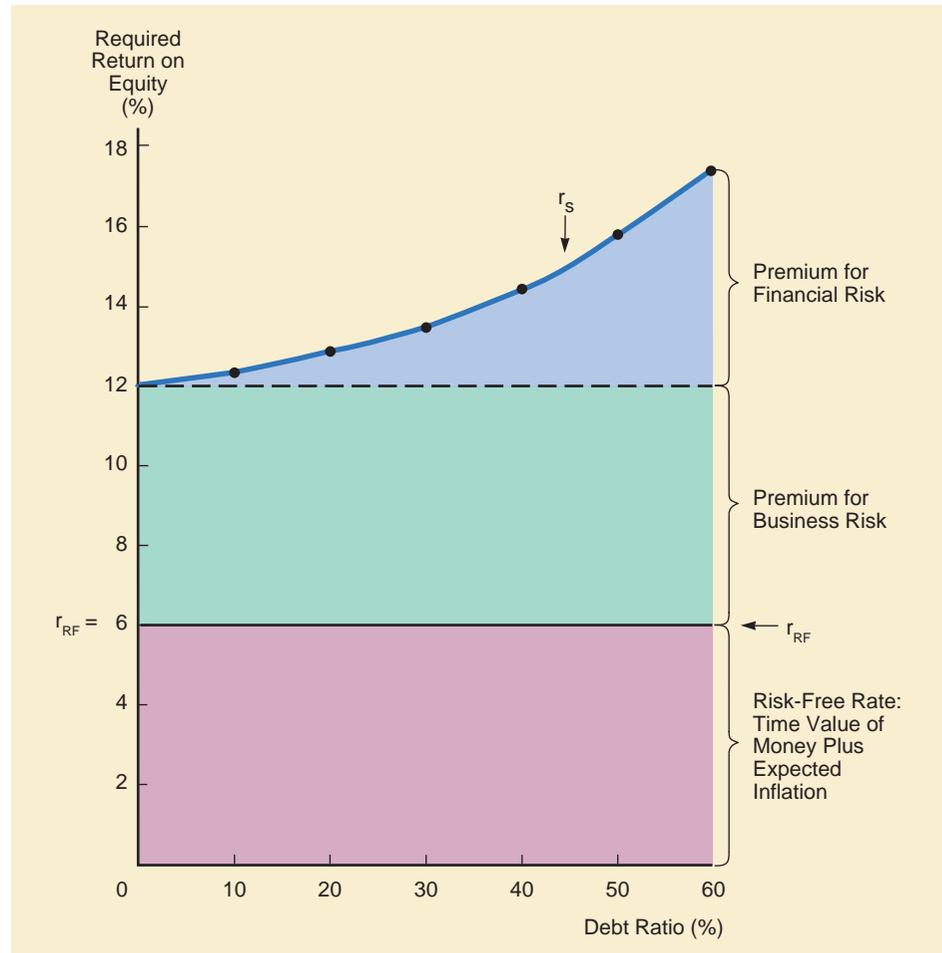
Column 9 of Table 14-3 also shows Bigbee's WACC at different capital structures. Currently, it has no debt, so its debt ratio is zero, and at this point $WACC = r_s = 12\%$. As Bigbee begins to use lower-cost debt, its WACC declines. However, as the debt ratio rises, the costs of both debt and equity rise, at first slowly but then at a faster and faster rate. Eventually, the increasing costs of the two components offset the fact that more low-cost debt is being used. Thus, at 40 percent debt, the WACC hits a minimum of 11.04 percent, and after that it rises with further increases in the debt ratio.

Note too that even though the component cost of equity is higher than that of debt, using only lower-cost debt would not maximize value because of the feedback effects of debt on the costs of debt and equity. For example, if Bigbee used more than 40 percent debt, say, 50 percent, it would have more of the cheaper capital, but this benefit would be more than offset by the fact that using more debt would raise the costs of both debt and equity.

These thoughts were echoed in a statement made by the Georgia-Pacific Corporation:

On a market-value basis, our debt-to-capital ratio is 47 percent. By employing this capital structure, we believe that our weighted average cost of capital is

FIGURE 14-7 *Bigbee's Required Rate of Return on Equity at Different Debt Levels*



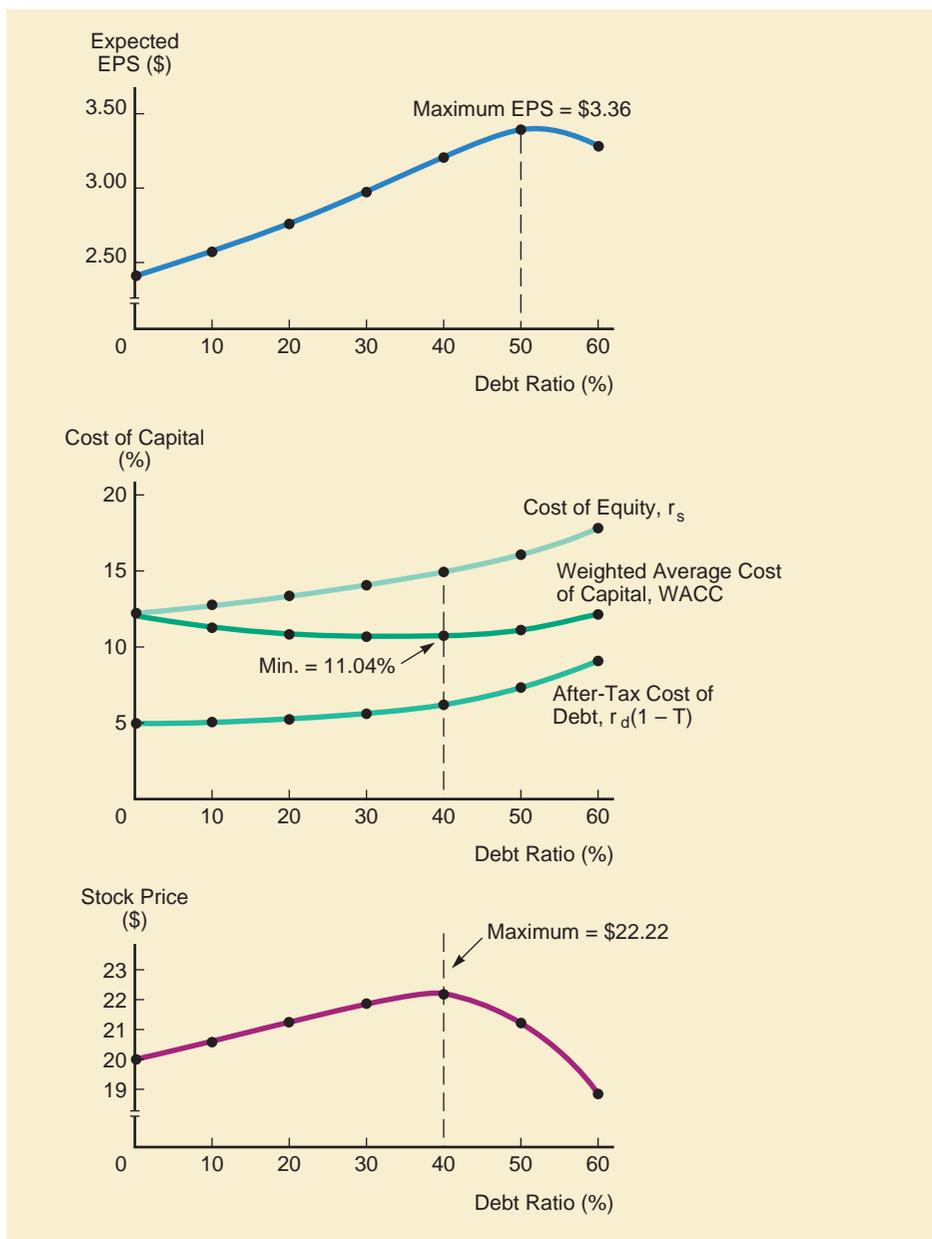
minimized, at approximately 10 percent. Although reducing debt would reduce our marginal cost of debt, this action would likely increase our weighted average cost of capital because we would then have to use more higher-cost equity.

Finally, and very importantly, recall that the capital structure that minimizes the WACC is also the capital structure that maximizes the firm's stock price. Bigbee pays out all of its earnings as dividends, so it plows zero earnings back into the business, and this leads to an expected growth rate in earnings and dividends of zero. Thus, in Bigbee's case we can use the zero growth stock price model developed in Chapter 9 to estimate the stock price at each different capital structure. These estimates are shown in Column 7 of Table 14-3. Here we see that the stock price first rises with financial leverage, hits a peak of \$22.22 at a debt ratio of 40 percent, and then begins to decline. *Thus, Bigbee's optimal capital structure occurs at a debt ratio of 40 percent, and that debt ratio both maximizes its stock price and minimizes its WACC.*⁷

⁷ We could also estimate the price of the stock if some earnings were retained and the expected growth rate was positive. However, this would complicate the analysis, and it is another reason we generally analyze the optimal capital structure decision using the WACC rather than the stock price.

The EPS, cost of capital, and stock price data shown in Table 14-3 are plotted in Figure 14-8. As the graph shows, the debt ratio that maximizes Bigbee's expected EPS is 50 percent. However, the expected stock price is maximized, and the WACC is minimized, at a 40 percent debt ratio. Thus, Bigbee's optimal capital structure calls for 40 percent debt and 60 percent equity. Management should set its target capital structure at these ratios, and if the existing ratios are off target, it should move toward the target when new securities are issued.

FIGURE 14-8 Effects of Capital Structure on EPS, Cost of Capital, and Stock Price





What happens to the component costs of debt and equity when the debt ratio is increased? Why does this occur?

Using the Hamada equation, explain the effects of financial leverage on beta.

What is the equation for calculating a firm's unlevered beta?

Use the Hamada equation to calculate the unlevered beta for Firm X with the following data: $b_L = 1.25$; $T = 40\%$; Debt/Assets = 0.42; Equity/Assets = 0.58. ($b_U = 0.8714$)

What would the cost of equity be for Firm X at Equity/Assets ratios of 1.0 (no debt) and 0.58, assuming that $r_{RF} = 5\%$ and $RP_M = 4\%$? (8.49%, 10%)

Using a graph and illustrative data, discuss the premiums for financial risk and business risk at different debt levels. Do these premiums vary depending on the debt level? Explain.

Is expected EPS generally maximized at the optimal capital structure? Explain.

14.4 CAPITAL STRUCTURE THEORY

Business risk is an important determinant of the optimal capital structure, and firms in different industries have different business risks, so we would expect capital structures to vary considerably across industries, and this is indeed the case. For example, pharmaceutical companies generally have very different capital structures than airline companies. In addition, capital structures vary among firms within a given industry, which is a bit harder to explain. What factors can explain these differences? In an attempt to answer this question, academics and practitioners have developed a number of theories.

Modern capital structure theory began in 1958, when Professors Franco Modigliani and Merton Miller (hereafter MM) published what has been called the most influential finance article ever written.⁸ MM proved, under a questionable set of assumptions, that a firm's value should be unaffected by its capital structure. Put another way, MM's results suggest that it does not matter how a firm finances its operations, hence that capital structure is irrelevant. However, the assumptions upon which MM's study was based are not realistic, so their results are questionable. Here is a partial listing of their assumptions:

1. There are no brokerage costs.
2. There are no taxes.
3. There are no bankruptcy costs.
4. Investors can borrow at the same rate as corporations.
5. All investors have the same information as management about the firm's future investment opportunities.
6. EBIT is not affected by the use of debt.

Despite the fact that some of these assumptions are obviously unrealistic, MM's irrelevance result is extremely important. By indicating the conditions under which capital structure is irrelevant, MM provided us with clues about what is required if capital structure is to be relevant and hence to affect a firm's

⁸ Franco Modigliani and Merton H. Miller, "The Cost of Capital, Corporation Finance, and the Theory of Investment," *American Economic Review*, June 1958. Both Modigliani and Miller won Nobel Prizes for their work.

Yogi Berra on the M&M Proposition

When a waitress asked Yogi Berra (Baseball Hall of Fame catcher for the New York Yankees) whether he wanted his pizza cut into four pieces or eight, Yogi replied: "Better make it four. I don't think I can eat eight."^a

Yogi's quip helps convey the basic insight of Modigliani and Miller. The firm's choice of leverage "slices" the distribution of future cash flows in a way that is like slicing a pizza. MM recognized that if you fix a company's investment activities, it's like fixing the size of the pizza; no information costs means that everyone sees the same pizza; no taxes means the IRS gets none of the pie; and no "contracting" costs means nothing sticks to the knife.

So, just as the substance of Yogi's meal is unaffected by whether the pizza is sliced into four pieces or eight, the economic substance of the firm is unaffected by whether the liability side of the balance sheet is sliced to include more or less debt under the MM assumptions. Note, though, that whereas the IRS may get none of Yogi's pizza, it is very likely to get some of the firm's income. Yogi's assumptions are a lot more realistic than MM's.

^a Lee Green, *Sportswit* (New York: Fawcett Crest, 1984), p. 228.

Source: "Yogi Berra on the M&M Proposition," *Journal of Applied Corporate Finance*, Vol. 7, no. 4 (Winter 1995), p. 6. Used by permission.

value. MM's work marked the beginning of modern capital structure research, and subsequent research has focused on relaxing the MM assumptions in order to develop a more realistic theory of capital structure. Research in this area is quite extensive, but the highlights are summarized in the following sections.

The Effect of Taxes⁹

MM's original paper was criticized harshly, so they published a follow-up paper in 1963 in which they relaxed the assumption that there are no corporate taxes.¹⁰ Here they recognized that the Tax Code allows corporations to deduct interest payments as an expense, but dividend payments to stockholders are not deductible. This differential treatment encourages corporations to use debt in their capital structures. Indeed, MM demonstrated that if all their other assumptions hold, this differential treatment leads to an optimal capital structure with 100 percent debt.

MM's 1963 work was modified several years later by Merton Miller (this time without Modigliani), when he brought in the effects of personal taxes.¹¹ Miller noted that bonds pay interest, which is taxed as personal income at rates going up to 35 percent, while income from stocks comes partly from dividends and partly from capital gains. Further, long-term capital gains are taxed at a maximum rate of 15 percent, and this tax can be deferred until the stock is sold and the gain realized. If a stock is held until the owner dies, no capital gains tax whatever must be paid. So, on balance, returns on common stocks are taxed at lower effective rates than returns on debt.¹²

⁹ This section is relatively technical, and it can be omitted without loss of continuity.

¹⁰ Franco Modigliani and Merton H. Miller, "Corporate Income Taxes and the Cost of Capital: A Correction," *American Economic Review*, Vol. 53 (June 1963), pp. 433–443.

¹¹ Merton H. Miller, "Debt and Taxes," *Journal of Finance*, Vol. 32 (May 1977), pp. 261–275.

¹² When Miller wrote his article, dividends were taxed at a maximum rate of 70 percent and capital gains at a much lower rate. Today (2005), dividends and capital gains are both taxed at a maximum rate of 15 percent, but interest is taxed at a maximum rate of 35 percent. These tax law changes would not affect Miller's final conclusion.

Because of the tax situation, Miller argued that investors are willing to accept relatively low before-tax returns on stocks as compared to the before-tax returns on bonds. For example, an investor in the 35 percent tax bracket might require a 10 percent pre-tax return on Bigbee's bonds, which would result in a $10\% (1 - T) = 10\%(0.65) = 6.5\%$ after-tax return. Bigbee's stock is riskier than its bonds, so the investor would require a higher after-tax return, say, 8.5 percent, on the stock. Because the stock's returns (either dividends or capital gains) would be taxed at only 15 percent, a pre-tax return of $8.5\% / (1 - T) = 8.5\% / 0.85 = 10.0\%$ would provide the required 8.5 percent after-tax return. In this example, the interest rate on the bonds would be 10 percent, the same as the required return on the stock, r_s . Thus, the more favorable treatment of income on the stock would cause investors to accept the same before-tax returns on the stock and the bond.¹³

As Miller pointed out, (1) the *deductibility of interest* favors the use of debt financing, but (2) the *more favorable tax treatment of income from stocks* lowers the required rates of return on stocks and thus favors the use of equity financing. It is difficult to specify the net effect of these two factors. However, most observers believe that interest deductibility has the stronger effect, hence that our tax system favors the corporate use of debt. Still, that effect is certainly reduced by the lower taxes on stock income.

Duke University professor John Graham estimated the overall tax benefits of debt financing.¹⁴ He concluded that the tax benefits associated with debt financing represent about 7 percent of the average firm's value, so if a leverage-free firm decided to use an average amount of debt, its value would rise by 7 percent.

We can observe changes in corporate financing patterns following major changes in tax rates. For example, in 1993 the top personal tax rate on interest and dividends was raised sharply, but the capital gains tax rate was not increased. This resulted in greater reliance on equity financing, especially through retained earnings. Subsequent reductions in the tax rate on both dividends and capital gains further benefited equity over debt, which continued the trend toward a greater reliance on equity financing.

The Effect of Potential Bankruptcy

MM's irrelevance results also depend on the assumption that firms don't go bankrupt, hence that bankruptcy costs are irrelevant. However, in practice bankruptcy exists, and it can be quite costly. Firms in bankruptcy have very high legal and accounting expenses, and they also have a hard time retaining customers, suppliers, and employees. Moreover, bankruptcy often forces a firm to liquidate assets for less than they would be worth if the firm continued to operate. Assets such as plant and equipment are often illiquid because they are configured to a company's individual needs and also because they are difficult to disassemble and move.

Note too that the *threat of bankruptcy*, not just bankruptcy per se, brings about these problems. If they become concerned about the firm's future, key employees start jumping ship, suppliers start refusing to grant credit, customers begin seeking more stable suppliers, and lenders start demanding higher interest rates and imposing more restrictive loan covenants.

¹³ The situation here is similar to that with tax-exempt municipal bonds versus taxable bonds as discussed in Chapter 7.

¹⁴ John R. Graham, "How Big Are the Tax Benefits of Debt?" *Journal of Finance*, Vol. 55 (2000), pp. 1901–1941; and "Estimating the Tax Benefits of Debt," *Journal of Applied Corporate Finance*, Vol. 14, no. 1 (Spring 2001), pp. 42–54.

Bankruptcy-related problems are likely to increase the more debt a firm has in its capital structure. Therefore, bankruptcy costs discourage firms from pushing their use of debt to excessive levels. Note too that bankruptcy-related costs have two components: (1) the probability of their occurrence and (2) the costs that would be incurred if financial distress arises. A firm whose earnings are relatively volatile, all else equal, faces a greater chance of bankruptcy and thus should use less debt than a more stable firm. This is consistent with our earlier point that firms with high operating leverage, and thus greater business risk, should limit their use of financial leverage. Likewise, firms whose assets are illiquid and thus would have to be sold at “fire sale” prices should limit their use of debt financing.

Trade-Off Theory

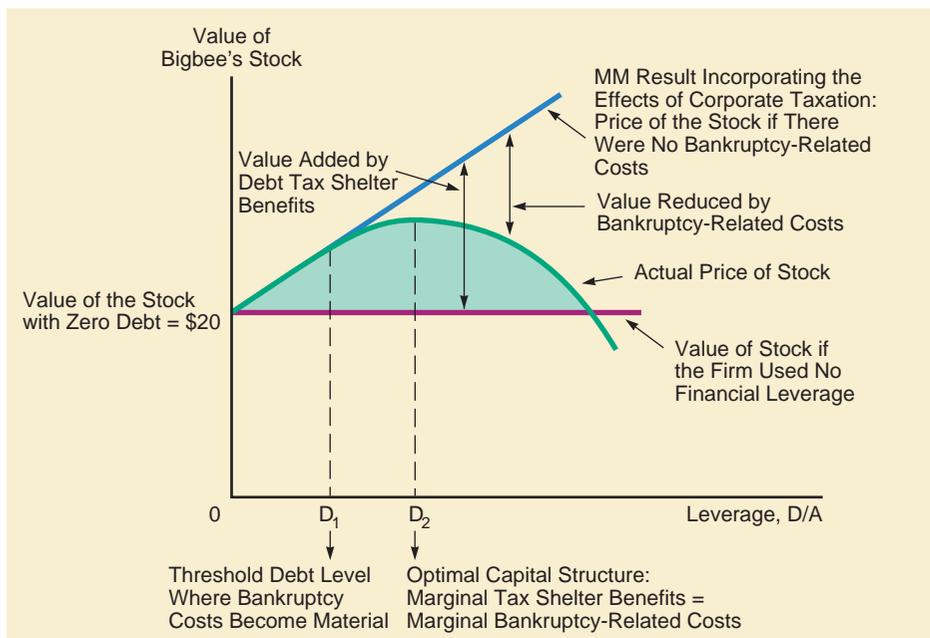
The preceding arguments led to the development of what is called “the trade-off theory of leverage,” in which firms trade off the tax benefits of debt financing against problems caused by potential bankruptcy. A summary of the **trade-off theory** is expressed graphically in Figure 14-9. Here are some observations about the figure:

1. The fact that interest paid is a deductible expense makes debt less expensive than common or preferred stock. In effect, the government pays part of the cost of debt, or, to put it another way, debt provides *tax shelter benefits*. As a result, using more debt reduces taxes and thus allows more of the firm’s operating income (EBIT) to flow through to investors. This factor, on which MM focused, tends to raise the stock’s price. Indeed, under the assumptions

Trade-Off Theory

The capital structure theory that states firms trade off the tax benefits of debt financing against problems caused by potential bankruptcy.

FIGURE 14-9 Effect of Leverage on the Value of Bigbee’s Stock



of their original paper, the stock price would be maximized at 100 percent debt. The line labeled “MM Result Incorporating the Effects of Corporate Taxation” in Figure 14-9 expresses the relationship between stock prices and debt under their assumptions.

2. In the real world, firms have target debt ratios that call for less than 100 percent debt, and the reason is to hold down the adverse effects of potential bankruptcy.
3. There is some threshold level of debt, labeled D_1 in Figure 14-9, below which the probability of bankruptcy is so low as to be immaterial. Beyond D_1 , however, bankruptcy-related costs become increasingly important, and they begin to offset the tax benefits of debt. In the range from D_1 to D_2 , bankruptcy-related costs reduce but do not completely offset the tax benefits of debt, so the firm’s stock price continues to rise (but at a decreasing rate) as its debt ratio increases. However, beyond D_2 , bankruptcy-related costs exceed the tax benefits, so from this point on increasing the debt ratio lowers the stock price. Therefore, D_2 is the optimal capital structure, the one where the stock price is maximized. Of course, D_1 and D_2 vary from firm to firm, depending on their business risk and bankruptcy costs.
4. While theoretical and empirical work supports the general shape of the curves in Figures 14-8 and 14-9, these graphs must be taken as approximations, not as precisely defined functions. The numbers in Figure 14-8 are shown out to two decimal places, but that is merely for illustrative purposes—the numbers are not nearly that accurate in view of the fact that the graph is based on judgmental estimates.
5. Another disturbing aspect of capital structure theory as expressed in Figure 14-9 is the fact that many large, successful firms such as Intel and Microsoft use far less debt than the theory suggests. This point led to the development of signaling theory, which is discussed next.

Signaling Theory

MM assumed that everyone—investors and managers alike—have the same information about a firm’s prospects. This is called **symmetric information**. However, in fact managers often have better information than outside investors. This is called **asymmetric information**, and it has an important effect on the optimal capital structure. To see why, consider two situations, one where the company’s managers know that its prospects are extremely favorable (Firm F) and one where the managers know that the future looks unfavorable (Firm U).

Now suppose Firm F’s R&D labs have just discovered a nonpatentable cure for the common cold. They want to keep the new product a secret as long as possible to delay competitors’ entry into the market. New plants must be built to make the new product, so capital must be raised, but how should Firm F raise the needed capital? If it sells stock, then when profits from the new product start flowing in, the price of the stock would rise sharply and purchasers of the new stock would make a bonanza. The current stockholders (including the managers) would also do well, but not as well as they would have done if the company had not sold stock before the price increased, because then they would not have had to share the benefits of the new product with the new stockholders. *Therefore, we would expect a firm with very favorable prospects to avoid selling stock and, rather, to raise required new capital by using new debt even if this moved the debt ratio beyond the target level.*¹⁵

Symmetric Information

The situation in which investors and managers have identical information about firms’ prospects.

Asymmetric Information

The situation in which managers have different (better) information about firms’ prospects than do investors.

¹⁵ It would be illegal for Firm F’s managers to personally purchase more shares on the basis of their inside knowledge of the new product. They could be sent to jail if they did.

Now consider Firm U. Suppose its managers have information that new orders are off sharply because a competitor has installed new technology that improved its products' quality. Firm U must upgrade its own facilities, at a high cost, just to maintain its current sales. As a result, its return on investment will fall (but not by as much as if it took no action, which would lead to a 100 percent loss through bankruptcy). How should Firm U raise the needed capital? Here the situation is just the reverse of that facing Firm F—it will want to sell stock so that some of the adverse consequences will be borne by new investors. *Therefore, a firm with unfavorable prospects would want to finance with stock, which would mean bringing in new investors to share the losses.*¹⁶

The conclusion from all this is that firms with extremely bright prospects prefer not to finance through new stock offerings, whereas firms with poor prospects do like to finance with outside equity. How should you, as an investor, react to this conclusion? You ought to say, "If I see that a company plans to issue new stock, this should worry me because I know that management would not want to issue stock if future prospects looked good. However, management would want to issue stock if things looked bad. Therefore, I should lower my estimate of the firm's value, other things held constant, if it plans to issue new stock."

If you gave this answer, your views are consistent with those of sophisticated portfolio managers. *In a nutshell, the announcement of a stock offering is generally taken as a signal that the firm's prospects as seen by its management are not bright.* This, in turn, suggests that when a firm announces a new stock offering, more often than not, the price of its stock will decline.¹⁷ Empirical studies have shown that this situation does indeed exist.¹⁸

What are the implications of all this for capital structure decisions? Issuing stock emits a negative signal and thus tends to depress the stock price, so even if the company's prospects are bright, a firm should, in normal times, maintain a **reserve borrowing capacity** that can be used in the event that some especially good investment opportunity comes along. *This means that firms should, in normal times, use more equity and less debt than is suggested by the tax benefit/bankruptcy cost trade-off model illustrated in Figure 14-9.*

Using Debt Financing to Constrain Managers

In Chapter 1 we stated that conflicts of interest may arise if managers and shareholders have different objectives. Such conflicts are particularly likely when the firm has more cash than is needed to support its core operations. Managers often use excess cash to finance their pet projects or for perquisites such as plush offices, corporate jets, and sky boxes at sports arenas, all of which may do little to benefit stock prices.¹⁹ By contrast, managers with more limited free cash flow are less able to make wasteful expenditures.

Firms can reduce excess cash flow in a variety of ways. One way is to funnel some of it back to shareholders through higher dividends or stock repurchases.

Signal

An action taken by a firm's management that provides clues to investors about how management views the firm's prospects.

Reserve Borrowing Capacity

The ability to borrow money at a reasonable cost when good investment opportunities arise. Firms often use less debt than specified by the MM optimal capital structure in "normal" times to ensure that they can obtain debt capital later if necessary.

¹⁶ Of course, Firm U would have to make certain disclosures when it offered new shares to the public, but it might be able to meet the legal requirements without fully disclosing management's worst fears.

¹⁷ Stock issues are more of a negative signal for mature companies than for new, rapidly growing ones, where investors expect rapid growth to require additional equity.

¹⁸ See Paul Asquith and David W. Mullins, Jr., "The Impact of Initiating Dividend Payments on Shareholders' Wealth," *Journal of Business*, January 1983, pp. 77–96.

¹⁹ If you don't believe corporate managers can waste money, read Bryan Burrough, *Barbarians at the Gate* (New York: Harper & Row, 1990), the story of the takeover of RJR-Nabisco.

Another alternative is to tilt the target capital structure toward more debt in the hope that higher debt service requirements will force managers to become more disciplined. If debt is not serviced as required, the firm will be forced into bankruptcy, in which case its managers would lose their jobs. Therefore, a manager is less likely to buy an expensive new corporate jet if the firm has large debt service requirements.

A leveraged buyout (LBO) is a good way to reduce excess cash flow. In an LBO debt is used to finance the purchase of a high percentage of the company's shares. Indeed, the projected savings from reducing frivolous waste has motivated quite a few leveraged buyouts. As noted, high debt payments after the LBO force managers to conserve cash by eliminating unnecessary expenditures.

Of course, increasing debt and reducing free cash flow has its downside: It increases the risk of bankruptcy. A former professor (who is the newly appointed Federal Reserve Chairman) has argued that adding debt to a firm's capital structure is like putting a dagger into the steering wheel of a car.²⁰ The dagger—which points toward your stomach—motivates you to drive more carefully, but you may get stabbed if someone runs into you, even if you are being careful. The analogy applies to corporations in the following sense: Higher debt forces managers to be more careful with shareholders' money, but even well-run firms could face bankruptcy (get stabbed) if some event beyond their control such as a war, an earthquake, a strike, or a recession occurs. To complete the analogy, the capital structure decision comes down to deciding how big a dagger stockholders should use to keep managers in line.

If you find our discussion of capital structure theory imprecise and somewhat confusing, you're not alone. In truth, no one knows how to identify a firm's precise optimal capital structure or how to measure the effects of capital structure changes on stock prices and the cost of capital. In practice, capital structure decisions must be made using a combination of judgment and numerical analysis. Still, an understanding of the theoretical issues presented here can help you make better judgments on capital structure issues.



Why does MM's theory with taxes lead to 100 percent debt?

How would an increase in corporate taxes tend to affect firms' capital structures? What about personal taxes?

Explain what asymmetric information means, and how signals affect capital structure decisions.

What is meant by reserve borrowing capacity, and why is it important to firms?

How can the use of debt serve to discipline managers?

14.5 CHECKLIST FOR CAPITAL STRUCTURE DECISIONS

In addition to the types of analysis discussed previously, firms generally consider the following factors when making capital structure decisions:

²⁰ Ben Bernanke, "Is There Too Much Corporate Debt?" Federal Reserve Bank of Philadelphia *Business Review*, September/October 1989, pp. 3–13.

1. *Sales stability.* A firm whose sales are relatively stable can safely take on more debt and incur higher fixed charges than a company with unstable sales. Utility companies, because of their stable demand, have historically been able to use more financial leverage than industrial firms.
2. *Asset structure.* Firms whose assets are suitable as security for loans tend to use debt rather heavily. General-purpose assets that can be used by many businesses make good collateral, whereas special-purpose assets do not. Thus, real estate companies are usually highly leveraged, whereas companies involved in technological research are not.
3. *Operating leverage.* Other things the same, a firm with less operating leverage is better able to employ financial leverage because it will have less business risk.
4. *Growth rate.* Other things the same, faster growing firms must rely more heavily on external capital. Further, the flotation costs involved in selling common stock exceed those incurred when selling debt, which encourages rapidly growing firms to rely more heavily on debt. At the same time, however, those firms often face higher uncertainty, which tends to reduce their willingness to use debt.
5. *Profitability.* It is often observed that firms with very high rates of return on investment use relatively little debt. Although there is no theoretical justification for this fact, one practical explanation is that very profitable firms such as Intel, Microsoft, and Coca-Cola simply do not need to do much debt financing. Their high rates of return enable them to do most of their financing with internally generated funds.
6. *Taxes.* Interest is a deductible expense, and deductions are most valuable to firms with high tax rates. Therefore, the higher a firm's tax rate, the greater the advantage of debt.
7. *Control.* The effect of debt versus stock on a management's control position can influence capital structure. If management currently has voting control (more than 50 percent of the stock) but is not in a position to buy any more stock, it may choose debt for new financings. On the other hand, management may decide to use equity if the firm's financial situation is so weak that the use of debt might subject it to serious risk of default, because if the firm goes into default, the managers will probably lose their jobs. However, if too little debt is used, management runs the risk of a takeover. Thus, control considerations could lead to the use of either debt or equity because the type of capital that best protects management will vary from situation to situation. In any event, if management is at all insecure, it will consider the control situation.
8. *Management attitudes.* No one can prove that one capital structure will lead to higher stock prices than another. Management, then, can exercise its own judgment about the proper capital structure. Some managements tend to be more conservative than others, and thus use less debt than an average firm in their industry, whereas aggressive managements use more debt in their quest for higher profits.
9. *Lender and rating agency attitudes.* Regardless of managers' own analyses of the proper leverage factors for their firms, lenders' and rating agencies' attitudes frequently influence financial structure decisions. Corporations often discuss their capital structures with lenders and rating agencies and give much weight to their advice. For example, one large utility was recently told by Moody's and Standard & Poor's that its bonds would be downgraded if it issued more bonds. This influenced its decision, and it financed its expansion with common equity.

10. *Market conditions.* Conditions in the stock and bond markets undergo both long- and short-run changes that can have an important bearing on a firm's optimal capital structure. For example, during a recent credit crunch, the junk bond market dried up, and there was simply no market at a "reasonable" interest rate for any new long-term bonds rated below BBB. Therefore, low-rated companies in need of capital were forced to go to the stock market or to the short-term debt market, regardless of their target capital structures. When conditions eased, however, these companies sold long-term bonds to get their capital structures back on target.
11. *The firm's internal condition.* A firm's own internal condition can also have a bearing on its target capital structure. For example, suppose a firm has just successfully completed an R&D program, and it forecasts higher earnings in the immediate future. However, the new earnings are not yet anticipated by investors, hence are not reflected in the stock price. This company would not want to issue stock—it would prefer to finance with debt until the higher earnings materialize and are reflected in the stock price. Then it could sell an issue of common stock, use the proceeds to retire the debt, and return to its target capital structure. This point was discussed earlier in connection with asymmetric information and signaling.
12. *Financial flexibility.* An astute corporate treasurer made this statement to the authors:

Our company can earn a lot more money from good capital budgeting and operating decisions than from good financing decisions. Indeed, we are not sure exactly how financing decisions affect our stock price, but we know for sure that having to turn down promising ventures because funds are not available will reduce our long-run profitability. For this reason, my primary goal as treasurer is to always be in a position to raise the capital needed to support operations.

We also know that when times are good, we can raise capital with either stocks or bonds, but when times are bad, suppliers of capital are much more willing to make funds available if we give them a stronger position, and this means debt. Further, when we sell a new issue of stock, this sends a negative "signal" to investors, so stock sales by a mature company such as ours are not desirable.

Putting all these thoughts together gives rise to the goal of maintaining financial flexibility, which, from an operational viewpoint, means maintaining adequate "reserve borrowing capacity." Determining the "adequate" reserve is judgmental, but it clearly depends on the factors discussed in the chapter, including the firm's forecasted need for funds, predicted capital market conditions, management's confidence in its forecasts, and the consequences of a capital shortage.



- How does sales stability affect the target capital structure?
- How do the types of assets used affect a firm's capital structure?
- How do taxes affect the target capital structure?
- How do lender and rating agency attitudes affect capital structure?
- How does the firm's internal condition affect its actual capital structure?
- What is financial flexibility, and is it increased or decreased by a high debt ratio?

GLOBAL PERSPECTIVES

Taking a Look at Global Capital Structures

To what extent does capital structure vary across different countries? The following table, which is taken from a recent study by Raghuram Rajan and Luigi Zingales, both of the University of Chicago, shows the median debt ratios of firms in the largest industrial countries.

Rajan and Zingales show that there is considerable variation in capital structure among firms within each of the seven countries. They also show that capital structures for the firms in each country are

generally determined by a similar set of factors: firm size, profitability, market-to-book ratio, and the ratio of fixed assets to total assets. All in all, the Rajan-Zingales study suggests that the points developed in this chapter apply to firms all around the world.

Source: Raghuram G. Rajan and Luigi Zingales, "What Do We Know about Capital Structure? Some Evidence from International Data," *Journal of Finance*, Vol. 50, no. 5 (December 1995), pp. 1421–1460. Used with permission.

MEDIAN PERCENTAGE OF DEBT TO TOTAL ASSETS IN DIFFERENT COUNTRIES

Country	Book Value Debt Ratio
United Kingdom	10%
Germany	11
France	18
Italy	21
Japan	21
United States	25
Canada	32

14.6 VARIATIONS IN CAPITAL STRUCTURES

As might be expected, wide variations in the use of financial leverage occur both across industries and among the individual firms in each industry. Table 14-4 illustrates differences for selected industries; the ranking is in descending order of the common equity ratio, as shown in Column 1.²¹

Pharmaceutical and computer companies use relatively little debt because their industries tend to be cyclical, oriented toward research, or subject to huge product liability suits. Utility companies, on the other hand, use debt relatively heavily because their fixed assets make good security for mortgage bonds and also because their relatively stable sales make it safe to carry more than average debt.

The times-interest-earned (TIE) ratio gives an indication of how vulnerable the company is to financial distress. This ratio depends on three factors: (1) the percentage of debt, (2) the interest rate on the debt, and (3) the company's profitability. Generally, low-leveraged industries such as computers and pharmaceuticals have high coverage ratios, whereas industries such as utilities, which finance heavily with debt, have low coverages.

Wide variations also exist among firms within given industries. For example, although the average ratio of common equity to total capital in 2005 for the pharmaceutical industry was about 81 percent, GlaxoSmithKline had a ratio of only 57.5 percent. Thus, factors unique to individual firms, including managerial attitudes, play an important role in setting target capital structures.

²¹ Information on capital structures and financial strength is available from a multitude of sources. We used the *MSN Money* Web site to develop Table 14-4, but published sources include *The Value Line Investment Survey*, *Robert Morris Association Annual Studies*, and *Dun & Bradstreet Key Business Ratios*.

TABLE 14-4 *Capital Structure Percentages, 2005: Six Industries Ranked by Common Equity Ratios^a*

Industry	Common Equity Ratio ^b (1)	Long-Term Debt Ratio (2)	Times-Interest-Earned Ratio (3)	Return on Equity (4)
Pharmaceuticals	80.65%	19.35%	31.6	22.00%
Computers	76.34	23.66	61.6	15.90
Steel	67.57	32.43	10.4	39.30
Aerospace	64.10	35.90	4.7	11.60
Railroads	59.17	40.83	3.8	9.80
Utilities	40.65	59.35	2.2	10.10

Notes:

^a Capital structure ratios are calculated as a percentage of total capital, where total capital is defined as long-term debt plus equity, with both measured at book value.

^b These ratios are based on accounting (or book) values. Stated on a market-value basis, the equity percentages would rise because most stocks sell at prices that are much higher than their book values.

Source: MSN Money; <http://moneycentral.msn.com>; June 24, 2005.



Why do wide variations in the use of financial leverage occur both across industries and among individual firms in each industry?

Tying It All Together

When we studied the cost of capital in Chapter 10, we took the firm's financing choice as given and then calculated the cost of capital based on that capital structure. Then, in Chapters 11, 12, and 13, we described capital budgeting techniques, which use the cost of capital as input. Capital budgeting decisions determine the types of projects that the firm accepts, which affect the nature of the firm's assets and its business risk. In this chapter we reverse the process, taking the firm's assets and business risk as given and then seeking to determine the best way to finance those assets. More specifically, in this chapter we examined the effects of financial leverage on stock prices, earnings per share, and the cost of capital, and we discussed various theories of capital structure.

The different theories lead to different conclusions about the optimal capital structure, and no one has been able to prove that one theory is better than the others. Therefore, we cannot estimate the optimal capital structure with much precision. Accordingly, financial executives generally treat the optimal capital structure as a range—for example, 40 to 50 percent debt—rather than as a precise point, such as 45 percent. The concepts discussed in this chapter are used as a guide, and they help managers understand the factors that should be considered when setting their target capital structures.

SELF-TEST QUESTIONS AND PROBLEMS (Solutions Appear in Appendix A)

- ST-1 Key terms** Define each of the following terms:
- Optimal capital structure; target capital structure
 - Business risk; financial risk
 - Financial leverage; operating leverage; operating breakeven
 - Hamada equation; unlevered beta
 - Symmetric information; asymmetric information
 - Modigliani-Miller theories
 - Trade-off theory; signaling theory
 - Reserve borrowing capacity
- ST-2 Operating leverage and breakeven analysis** Olinde Electronics Inc. produces stereo components that sell at $P = \$100$ per unit. Olinde's fixed costs are \$200,000; variable costs are \$50 per unit; 5,000 components are produced and sold each year; EBIT is currently \$50,000; and Olinde's assets (all equity financed) are \$500,000. Olinde can change its production process by adding \$400,000 to assets and \$50,000 to fixed operating costs. This change would (1) reduce variable costs per unit by \$10 and (2) increase output by 2,000 units, but (3) the sales price on all units would have to be lowered to \$95 to permit sales of the additional output. Olinde has tax loss carry-forwards that cause its tax rate to be zero, it uses no debt, and its average cost of capital is 10 percent.
- Should Olinde make the change?
 - Would Olinde's breakeven point increase or decrease if it made the change?
 - Suppose Olinde were unable to raise additional equity financing and had to borrow the \$400,000 at an interest rate of 10 percent to make the investment. Use the Du Pont equation to find the expected ROA of the investment. Should Olinde make the change if debt financing must be used?
- ST-3 Financial leverage** Gentry Motors Inc., a producer of turbine generators, is in this situation: EBIT = \$4 million; tax rate = $T = 35\%$; debt outstanding = $D = \$2$ million; $r_d = 10\%$; $r_s = 15\%$; shares of stock outstanding = $N_0 = 600,000$; and book value per share = \$10. Because Gentry's product market is stable and the company expects no growth, all earnings are paid out as dividends. The debt consists of perpetual bonds.
- What are Gentry's earnings per share (EPS) and its price per share (P_0)?
 - What is Gentry's weighted average cost of capital (WACC)?
 - Gentry can increase its debt by \$8 million, to a total of \$10 million, using the new debt to buy back and retire some of its shares at the current price. Its interest rate on debt will be 12 percent (it will have to call and refund the old debt), and its cost of equity will rise from 15 to 17 percent. EBIT will remain constant. Should Gentry change its capital structure?
 - If Gentry did not have to refund the \$2 million of old debt, how would this affect things? Assume that the new and the still outstanding debt are equally risky, with $r_d = 12\%$, but that the coupon rate on the old debt is 10 percent.
 - What is Gentry's TIE coverage ratio under the original situation and under the conditions in part c of this question?

QUESTIONS

- 14-1** Changes in sales cause changes in profits. Would the profit change associated with sales changes be larger or smaller if a firm increased its operating leverage? Explain your answer.
- 14-2** Would each of the following increase, decrease, or have an indeterminate effect on a firm's breakeven point (unit sales)?
- An increase in the sales price with no change in unit costs.
 - An increase in fixed costs accompanied by a decrease in variable costs.
 - A new firm decides to use MACRS depreciation for both book and tax purposes rather than the straight-line depreciation method.
 - Variable labor costs decline; other things are held constant.

- 14-3** Discuss the following statement: “All else equal, firms with relatively stable sales are able to carry relatively high debt ratios.” Is the statement true or false? Why?
- 14-4** If Congress increased the personal tax rate on dividends and capital gains but simultaneously reduced the rate on corporate income, what effect would this have on the average company’s capital structure?
- 14-5** Which of the following would likely encourage a firm to increase the debt in its capital structure?
- The corporate tax rate increases.
 - The personal tax rate increases.
 - Due to market changes, the firm’s assets become less liquid.
 - Changes in the bankruptcy code make bankruptcy less costly to the firm.
 - The firm’s sales and earnings become more volatile.
- 14-6** Why do public utilities generally use different capital structures than drug companies?
- 14-7** Why is EBIT generally considered to be independent of financial leverage? Why might EBIT actually be affected by financial leverage at high debt levels?
- 14-8** Is the debt level that maximizes a firm’s expected EPS the same as the one that maximizes its stock price? Explain.
- 14-9** If a firm goes from zero debt to successively higher levels of debt, why would you expect its stock price to first rise, then hit a peak, and then begin to decline?
- 14-10** When the Bell System was originally broken up, the old AT&T was split into a new AT&T plus 7 regional telephone companies. The specific reason for forcing the breakup was to increase the degree of competition in the telephone industry. AT&T had a monopoly on local service, long distance, and the manufacture of all the equipment used by telephone companies, and the breakup was expected to open most of these markets to competition. In the court order that set the terms of the breakup, the capital structures of the surviving companies were specified, and much attention was given to the increased competition telephone companies could expect in the future. Do you think the optimal capital structure after the breakup was the same as the pre-breakup optimal capital structure? Explain your position.
- 14-11** A firm is about to double its assets to serve its rapidly growing market. It must choose between a highly automated production process and a less automated one, and it must also choose a capital structure for financing the expansion. Should the asset investment and financing decisions be jointly determined, or should each decision be made separately? How would these decisions affect one another? How could the leverage concept be used to help management analyze the situation?

PROBLEMS

Easy
Problems 1–5

- 14-1 Breakeven analysis** A company’s fixed operating costs are \$500,000, its variable costs are \$3.00 per unit, and the product’s sales price is \$4.00. What is the company’s breakeven point; that is, at what unit sales volume would its income equal its costs?
- 14-2 Optimal capital structure** Jackson Trucking Company is in the process of setting its target capital structure. The CFO believes the optimal debt ratio is somewhere between 20 and 50 percent, and her staff has compiled the following projections for EPS and the stock price at various debt levels:

Debt Ratio	Projected EPS	Projected Stock Price
20%	\$3.20	\$35.00
30	3.45	36.50
40	3.75	36.25
50	3.50	35.50

Assuming that the firm uses only debt and common equity, what is Jackson’s optimal capital structure? At what debt ratio is the company’s WACC minimized?

14-3 Risk analysis

- a. Given the following information, calculate the expected value for Firm C's EPS. Data for Firms A and B are as follows: $E(\text{EPS}_A) = \$5.10$, and $\sigma_A = \$3.61$; $E(\text{EPS}_B) = \$4.20$, and $\sigma_B = \$2.96$.

	PROBABILITY				
	0.1	0.2	0.4	0.2	0.1
Firm A: EPS_A	(\$1.50)	\$1.80	\$5.10	\$8.40	\$11.70
Firm B: EPS_B	(1.20)	1.50	4.20	6.90	9.60
Firm C: EPS_C	(2.40)	1.35	5.10	8.85	12.60

- b. You are given that $\sigma_C = \$4.11$. Discuss the relative riskiness of the three firms' earnings.

14-4 Unlevered beta Harley Motors has \$10 million in assets, which were financed with \$2 million of debt and \$8 million in equity. Harley's beta is currently 1.2 and its tax rate is 40 percent. Use the Hamada equation to find Harley's unlevered beta, b_U .

14-5 Financial leverage effects Firms HL and LL are identical except for their leverage ratios and the interest rates they pay on debt. Each has \$20 million in assets, \$4 million of EBIT, and is in the 40 percent federal-plus-state tax bracket. Firm HL, however, has a debt ratio (D/A) of 50 percent and pays 12 percent interest on its debt, whereas LL has a 30 percent debt ratio and pays only 10 percent interest on its debt.

- Calculate the rate of return on equity (ROE) for each firm.
- Observing that HL has a higher ROE, LL's treasurer is thinking of raising the debt ratio from 30 to 60 percent, even though that would increase LL's interest rate on all debt to 15 percent. Calculate the new ROE for LL.

Intermediate Problems 6–9

14-6 Breakeven analysis The Weaver Watch Company sells watches for \$25; the fixed costs are \$140,000; and variable costs are \$15 per watch.

- What is the firm's gain or loss at sales of 8,000 watches? At 18,000 watches?
- What is the breakeven point? Illustrate by means of a chart.
- What would happen to the breakeven point if the selling price were raised to \$31? What is the significance of this analysis?
- What would happen to the breakeven point if the selling price were raised to \$31 but variable costs rose to \$23 a unit?

14-7 Financial leverage effects The Neal Company wants to estimate next year's return on equity (ROE) under different leverage ratios. Neal's total assets are \$14 million, it currently uses only common equity, and its federal-plus-state tax rate is 40 percent. The CFO has estimated next year's EBIT for 3 possible states of the world: \$4.2 million with a 0.2 probability, \$2.8 million with a 0.5 probability, and \$700,000 with a 0.3 probability. Calculate Neal's expected ROE, standard deviation, and coefficient of variation for each of the following debt ratios, and evaluate the results:

Debt Ratio	Interest Rate
0%	—
10	9%
50	11
60	14

14-8 Hamada equation Cyclone Software Co. is trying to establish its optimal capital structure. Its current capital structure consists of 25 percent debt and 75 percent equity; however, the CEO believes the firm should use more debt. The risk-free rate, r_{RF} , is 5 percent, the market risk premium, RP_M , is 6 percent, and the firm's tax rate is 40 percent. Currently, Cyclone's cost of equity is 14 percent, which is determined by the CAPM. What would be Cyclone's estimated cost of equity if it changed its capital structure to 50 percent debt and 50 percent equity?

14-9 Recapitalization Tapley Inc. currently has assets of \$5 million, zero debt, is in the 40 percent federal-plus-state tax bracket, has a net income of \$1 million, and pays out 40 percent of its earnings as dividends. Net income is expected to grow at a constant rate of 5 percent per year, 200,000 shares of stock are outstanding, and the current WACC is 13.40 percent.

The company is considering a recapitalization where it will issue \$1 million in debt and use the proceeds to repurchase stock. Investment bankers have estimated that if the company goes through with the recapitalization, its before-tax cost of debt will be 11 percent, and its cost of equity will rise to 14.5 percent.

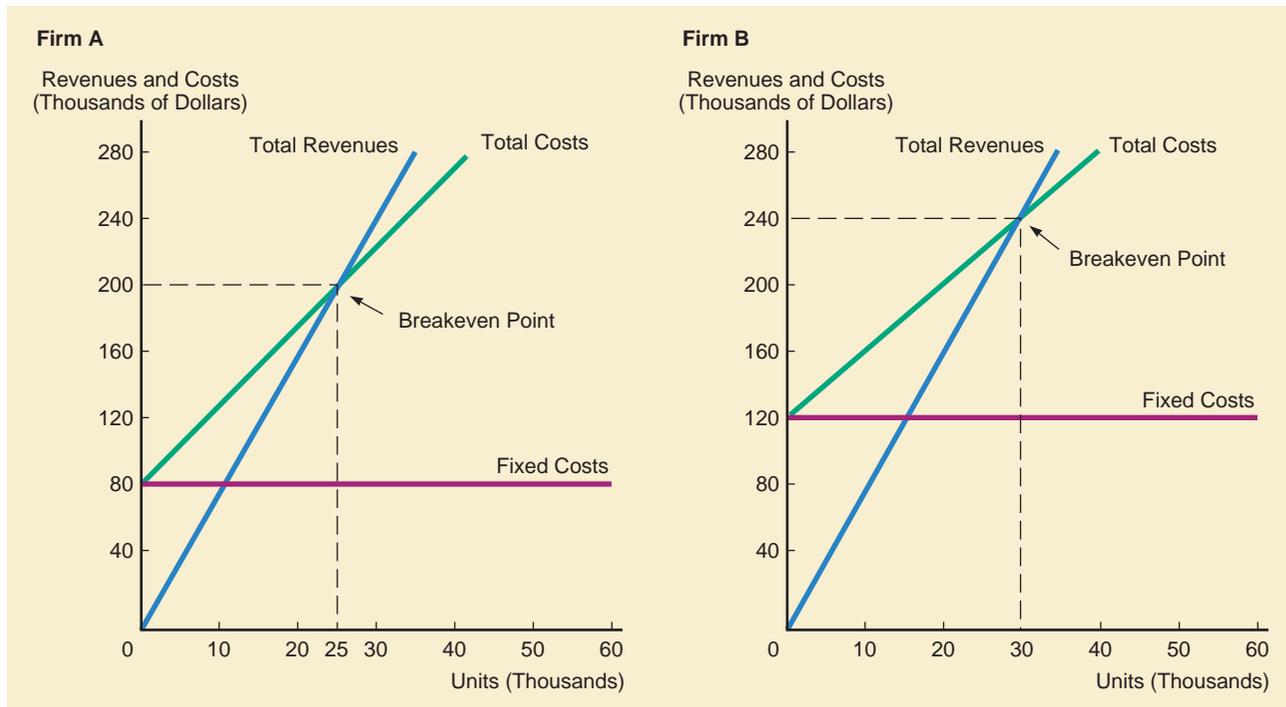
- What is the stock's current price per share (before the recapitalization)?
- Assuming that the company maintains the same payout ratio, what will be its stock price following the recapitalization?

Challenging
Problems 10–13

14-10 Breakeven and operating leverage

- Given the graphs shown below, calculate the total fixed costs, variable costs per unit, and sales price for Firm A. Firm B's fixed costs are \$120,000, its variable costs per unit are \$4, and its sales price is \$8 per unit.
- Which firm has the higher operating leverage at any given level of sales? Explain.
- At what sales level, in units, do both firms earn the same operating profit?

BREAKEVEN CHARTS FOR PROBLEM 14-10



14-11 Recapitalization Currently, Bloom Flowers Inc. has a capital structure consisting of 20 percent debt and 80 percent equity. Bloom's debt currently has an 8 percent yield to maturity. The risk-free rate (r_{RF}) is 5 percent, and the market risk premium ($r_M - r_{RF}$) is 6 percent. Using the CAPM, Bloom estimates that its cost of equity is currently 12.5 percent. The company has a 40 percent tax rate.

- What is Bloom's current WACC?
- What is the current beta on Bloom's common stock?
- What would Bloom's beta be if the company had no debt in its capital structure? (That is, what is Bloom's unlevered beta, b_U ?)

Bloom's financial staff is considering changing its capital structure to 40 percent debt and 60 percent equity. If the company went ahead with the proposed change, the yield to maturity on the company's bonds would rise to 9.5 percent. The proposed change will have no effect on the company's tax rate.

- What would be the company's new cost of equity if it adopted the proposed change in capital structure?
- What would be the company's new WACC if it adopted the proposed change in capital structure?
- Based on your answer to part e, would you advise Bloom to adopt the proposed change in capital structure? Explain.

14-12 Breakeven and leverage Wingle Communications Corporation (WCC) produces premium stereo headphones that sell for \$28.80 per set, and this year's sales are expected

to be 450,000 units. Variable production costs for the expected sales under present production methods are estimated at \$10,200,000, and fixed production (operating) costs at present are \$1,560,000. WCC has \$4,800,000 of debt outstanding at an interest rate of 8 percent. There are 240,000 shares of common stock outstanding, and there is no preferred stock. The dividend payout ratio is 70 percent, and WCC is in the 40 percent federal-plus-state tax bracket.

The company is considering investing \$7,200,000 in new equipment. Sales would not increase, but variable costs per unit would decline by 20 percent. Also, fixed operating costs would increase from \$1,560,000 to \$1,800,000. WCC could raise the required capital by borrowing \$7,200,000 at 10 percent or by selling 240,000 additional shares at \$30 per share.

- What would be WCC's EPS (1) under the old production process, (2) under the new process if it uses debt, and (3) under the new process if it uses common stock?
- At what unit sales level would WCC have the same EPS, assuming it undertakes the investment and finances it with debt or with stock? (Hint: $V = \text{variable cost per unit} = \$8,160,000/450,000$, and $\text{EPS} = [(PQ - VQ - F - I)(1 - T)]/N$. Set $\text{EPS}_{\text{Stock}} = \text{EPS}_{\text{Debt}}$ and solve for Q .)
- At what unit sales level would $\text{EPS} = 0$ under the three production/financing setups—that is, under the old plan, the new plan with debt financing, and the new plan with stock financing? (Hint: Note that $V_{\text{Old}} = \$10,200,000/450,000$, and use the hints for part b, setting the EPS equation equal to zero.)
- On the basis of the analysis in parts a through c, and given that operating leverage is lower under the new setup, which plan is the riskiest, which has the highest expected EPS, and which would you recommend? Assume here that there is a fairly high probability of sales falling as low as 250,000 units, and determine EPS_{Debt} and $\text{EPS}_{\text{Stock}}$ at that sales level to help assess the riskiness of the two financing plans.

14-13 Financing alternatives The Severn Company plans to raise a net amount of \$270 million to finance new equipment and working capital in early 2006. Two alternatives are being considered: Common stock may be sold to net \$60 per share, or bonds yielding 12 percent may be issued. The balance sheet and income statement of the Severn Company prior to financing are as follows:

The Severn Company: Balance Sheet as of December 31, 2005 (Millions of Dollars)

Current assets	\$ 900.00	Accounts payable	\$ 172.50
		Notes payable to bank	255.00
		Other current liabilities	<u>225.00</u>
		Total current liabilities	\$ 652.50
Net fixed assets	450.00	Long-term debt (10%)	300.00
		Common stock, \$3 par	60.00
		Retained earnings	<u>337.50</u>
Total assets	<u>\$1,350.00</u>	Total liabilities and equity	<u>\$1,350.00</u>

The Severn Company: Income Statement for Year Ended December 31, 2005 (Millions of Dollars)

Sales	\$2,475.00
Operating costs	<u>2,227.50</u>
Earnings before interest and taxes (10%)	\$ 247.50
Interest on short-term debt	15.00
Interest on long-term debt	<u>30.00</u>
Earnings before taxes	\$ 202.50
Federal-plus-state taxes (40%)	<u>81.00</u>
Net income	<u>\$ 121.50</u>

The probability distribution for annual sales is as follows:

Probability	Annual Sales (Millions of Dollars)
0.30	\$2,250
0.40	2,700
0.30	3,150

Assuming that EBIT equals 10 percent of sales, calculate earnings per share (EPS) under both the debt financing and the stock financing alternatives at each possible level of sales. Then calculate expected EPS and σ_{EPS} under both debt and stock financing alternatives. Also, calculate the debt ratio and the times-interest-earned (TIE) ratio at the expected sales level under each alternative. The old debt will remain outstanding. Which financing method do you recommend?

COMPREHENSIVE/SPREADSHEET PROBLEM

- 14-14 WACC and optimal capital structure** Elliott Athletics is trying to determine its optimal capital structure, which now consists of only debt and common equity. The firm does not currently use preferred stock in its capital structure, and it does not plan to do so in the future. Its treasury staff has consulted with investment bankers and, on the basis of those discussions, has created the following table showing its debt cost at different levels:

Debt-to-Assets Ratio (w_d)	Equity-to-Assets Ratio (w_e)	Debt-to-Equity Ratio (D/E)	Bond Rating	Before-Tax Cost of Debt (r_d)
0.0	1.0	0.00	A	7.0%
0.2	0.8	0.25	BBB	8.0
0.4	0.6	0.67	BB	10.0
0.6	0.4	1.50	C	12.0
0.8	0.2	4.00	D	15.0

Elliott uses the CAPM to estimate its cost of common equity, r_s , and estimates that the risk-free rate is 5 percent, the market risk premium is 6 percent, and its tax rate is 40 percent. Elliott estimates that if it had no debt, its “unlevered” beta, b_U , would be 1.2.

- What is the firm’s optimal capital structure, and what would be its WACC at the optimal capital structure?
- If Elliott’s managers anticipate that the company’s business risk will increase in the future, what effect would this increase likely have on its target capital structure?
- If Congress were to dramatically increase the corporate tax rate, what effect would this increase likely have on Elliott’s target capital structure?
- Plot a graph of the after-tax cost of debt, the cost of equity, and the WACC versus (1) the debt/assets ratio and (2) the debt/equity ratio.

Integrated Case

Campus Deli Inc.

- 14-15 Optimal capital structure** Assume that you have just been hired as business manager of Campus Deli (CD), which is located adjacent to the campus. Sales were \$1,100,000 last year; variable costs were 60 percent of sales; and fixed costs were \$40,000. Therefore, EBIT totaled \$400,000. Because the university’s enrollment is capped, EBIT is expected to be constant over time. Because no expansion capital is required, CD pays out all earnings as dividends. Assets are \$2 million, and 80,000 shares are outstanding. The management group owns about 50 percent of the stock, which is traded in the over-the-counter market.

CD currently has no debt—it is an all-equity firm—and its 80,000 shares outstanding sell at a price of \$25 per share, which is also the book value. The firm's federal-plus-state tax rate is 40 percent. On the basis of statements made in your finance text, you believe that CD's shareholders would be better off if some debt financing were used. When you suggested this to your new boss, she encouraged you to pursue the idea, but to provide support for the suggestion.

In today's market, the risk-free rate, r_{RF} , is 6 percent and the market risk premium, RP_M , is 6 percent. CD's unlevered beta, b_U , is 1.0. CD currently has no debt, so its cost of equity (and WACC) is 12 percent.

If the firm were recapitalized, debt would be issued, and the borrowed funds would be used to repurchase stock. Stockholders, in turn, would use funds provided by the repurchase to buy equities in other fast-food companies similar to CD. You plan to complete your report by asking and then answering the following questions.

- a. (1) What is business risk? What factors influence a firm's business risk?
(2) What is operating leverage, and how does it affect a firm's business risk?
- b. (1) What is meant by the terms "financial leverage" and "financial risk"?
(2) How does financial risk differ from business risk?
- c. Now, to develop an example that can be presented to CD's management as an illustration, consider two hypothetical firms, Firm U, with zero debt financing, and Firm L, with \$10,000 of 12 percent debt. Both firms have \$20,000 in total assets and a 40 percent federal-plus-state tax rate, and they have the following EBIT probability distribution for next year:

Probability	EBIT
0.25	\$2,000
0.50	3,000
0.25	4,000

- (1) Complete the partial income statements and the firms' ratios in Table IC14-1.
 - (2) Be prepared to discuss each entry in the table and to explain how this example illustrates the effect of financial leverage on expected rate of return and risk.
- d. After speaking with a local investment banker, you obtain the following estimates of the cost of debt at different debt levels (in thousands of dollars):

Amount Borrowed	D/A Ratio	D/E Ratio	Bond Rating	r_d
\$ 0	0	0	—	—
250	0.125	0.1429	AA	8.0%
500	0.250	0.3333	A	9.0
750	0.375	0.6000	BBB	11.5
1,000	0.500	1.0000	BB	14.0

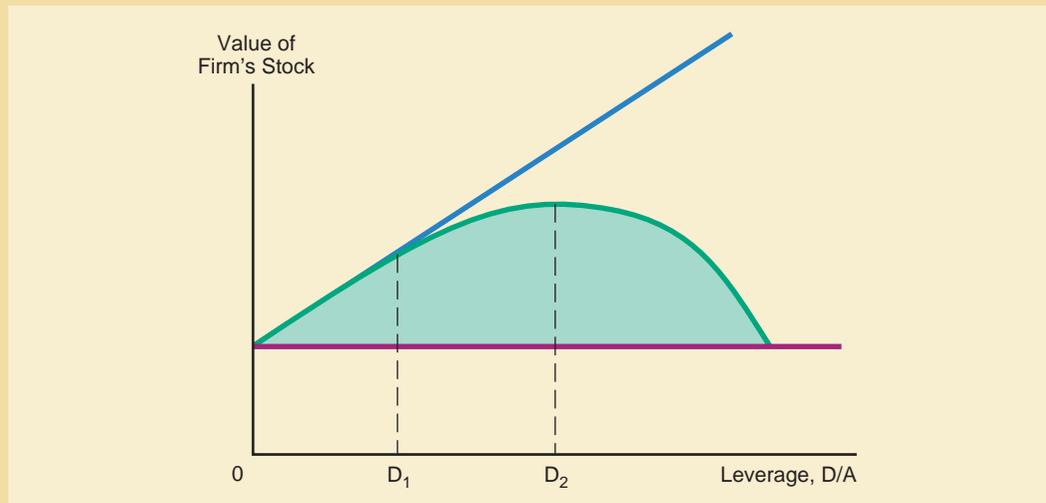
Now consider the optimal capital structure for CD.

- (1) To begin, define the terms "optimal capital structure" and "target capital structure."
- (2) Why does CD's bond rating and cost of debt depend on the amount of money borrowed?
- (3) Assume that shares could be repurchased at the current market price of \$25 per share. Calculate CD's expected EPS and TIE at debt levels of \$0, \$250,000, \$500,000, \$750,000, and \$1,000,000. How many shares would remain after recapitalization under each scenario?
- (4) Using the Hamada equation, what is the cost of equity if CD recapitalizes with \$250,000 of debt? \$500,000? \$750,000? \$1,000,000?
- (5) Considering only the levels of debt discussed, what is the capital structure that minimizes CD's WACC?
- (6) What would be the new stock price if CD recapitalizes with \$250,000 of debt? \$500,000? \$750,000? \$1,000,000? Recall that the payout ratio is 100 percent, so $g = 0$.
- (7) Is EPS maximized at the debt level that maximizes share price? Why or why not?

- (8) Considering only the levels of debt discussed, what is CD's optimal capital structure?
 (9) What is the WACC at the optimal capital structure?
- Suppose you discovered that CD had more business risk than you originally estimated. Describe how this would affect the analysis. What if the firm had less business risk than originally estimated?
 - What are some factors a manager should consider when establishing his or her firm's target capital structure?
 - Put labels on Figure IC14-1, and then discuss the graph as you might use it to explain to your boss why CD might want to use some debt.
 - How does the existence of asymmetric information and signaling affect capital structure?

TABLE IC14-1 *Income Statements and Ratios*

	Firm U			Firm L		
Assets	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000
Equity	\$20,000	\$20,000	\$20,000	\$10,000	\$10,000	\$10,000
Probability	0.25	0.50	0.25	0.25	0.50	0.25
Sales	\$ 6,000	\$ 9,000	\$12,000	\$ 6,000	\$ 9,000	\$12,000
Operating costs	4,000	6,000	8,000	4,000	6,000	8,000
Earnings before interest and taxes	\$ 2,000	\$ 3,000	\$ 4,000	\$ 2,000	\$ 3,000	\$ 4,000
Interest (12%)	0	0	0	1,200		1,200
Earnings before taxes	\$ 2,000	\$ 3,000	\$ 4,000	\$ 800	\$	\$ 2,800
Taxes (40%)	800	1,200	1,600	320		1,120
Net income	<u>\$ 1,200</u>	<u>\$ 1,800</u>	<u>\$ 2,400</u>	<u>\$ 480</u>	<u>\$</u>	<u>\$ 1,680</u>
Basic earning power (BEP = EBIT/Assets)	10.0%	15.0%	20.0%	10.0%	%	20.0%
ROE	6.0%	9.0%	12.0%	4.8%	%	16.8%
TIE	∞	∞	∞	1.7×	×	3.3×
Expected basic earning power		15.0%			%	
Expected ROE		9.0%			10.8%	
Expected TIE		∞			2.5×	
σ_{BEP}		3.5%			%	
σ_{ROE}		2.1%			4.2%	
σ_{TIE}		0			0.6×	

FIGURE IC14-1 *Relationship between Capital Structure and Stock Price*

Please go to the ThomsonNOW Web site to access the Cyberproblems.

THOMSON ONE Business School Edition

Access the Thomson ONE problems through the ThomsonNOW Web site. Use the Thomson ONE—Business School Edition online database to work this chapter's questions.

Exploring the Capital Structures for Four of the World's Leading Auto Companies

This chapter provides an overview of the effects of leverage and describes the process that firms use to determine their optimal capital structure. The chapter also indicates that capital structures tend to vary across industries and across countries. If you are interested in exploring these differences in more detail, Thomson One provides information about the capital structures of each of the companies it follows.

The following discussion questions demonstrate how we can use this information to evaluate the capital structures for four of the world's leading automobile companies: General Motors (GM), Ford (F), BMW (BMW), and Toyota (J:TYMO). As you gather information on these companies, be mindful of the currencies in which these companies' financial data are reported.

Discussion Questions

1. To get an overall picture of each company's capital structure it is helpful to see a chart that summarizes the company's capital structure over the past decade. To obtain this chart, choose a company to start with and select FINANCIALS. Next, select MORE>THOMSON REPORTS & CHARTS>CAPITAL STRUCTURE. This should generate a chart that plots the company's long-term debt, common equity, and total current liabilities over the past decade. What, if any, are the major trends that emerge from looking at these charts? Do these companies tend to have relatively high or relatively low levels of debt? Do these companies have significant levels of current liabilities? Have their capital structures changed over time? (Note an alternative chart can be found by selecting FINANCIALS>FUNDAMENTAL RATIOS>WORLDSCOPE RATIOS>DEBT TO ASSETS & EQUITY RATIOS.)
2. To get more details about the companies' capital structures over the past five years, select FINANCIALS>FUNDAMENTAL RATIOS>THOMSON RATIOS. From here you can select ANNUAL RATIOS and/or 5 YEAR AVERAGE RATIOS REPORT. In each case, you can scroll down and look for "Leverage Ratios." Here you will find a variety of leverage ratios for the past 5 years. (Notice that these 2 pages offer different information. The ANNUAL RATIOS page offers year-end leverage ratios, while the 5 YEAR AVERAGE RATIOS REPORT offers the average ratio over the previous 5 years for each calendar date. In other words, the 5 YEAR AVERAGE RATIOS REPORT smooths the changes in capital structure over the reporting period.) Do these ratios suggest that the company has significantly changed its capital structure over the past 5 years? If so, what factors could possibly explain this shift? (Financial statements might be useful to detect any shifts that may have led to the company's changing capital structure. You may also consult the company's annual report to see if there is any discussion and/or explanation for these changes. Both the historical financial statements and annual report information can be found via Thomson One.)
3. Repeat this procedure for the other 3 auto companies. Do you find similar capital structures for each of the 4 companies? Do you find that the capital structures have moved in the same direction over the past 5 years, or have the different companies changed their capital structures in different ways over the past 5 years?
4. The financial ratios investigated thus far are based on book values of debt and equity. Determine whether using the market value of equity (market capitalization

found on the OVERVIEW page) makes a significant difference in the most recent year's "LT Debt Pct Common Equity" and "Total Debt Pct Total Assets." (Note: "LT Debt" is defined by Thomson One as the "Long Term Debt" listed on the balance sheet, while "Total Debt" is defined as "Long Term Debt" plus "ST Debt & Current Portion Due LT Debt.") Are there big differences between the capital structures measured on a book or market basis?

5. You can also use Thomson One to search for companies with either very large or very small debt ratios. For example, if you want to find the top 50 companies with the highest debt ratio select: SEARCH FOR COMPANIES, ADVANCED SEARCH, ALL COMPANIES, THOMSON FINANCIAL, RATIOS, and LEVERAGE. From here, let's select "LT Debt Pct Total Cap 5 Yr. Avg." (This will focus in on the average capital structure over the past 5 years, which should give us perhaps a better indication of the company's long-run target capital structure.) Once you click on SELECT, you should see the "Search Expression Builder" screen. From here, you go to "Rank" and select the top 50 by typing 50 in the box below rank, and click on ADD. You can easily change this to also select the bottom 50 (or perhaps the bottom 5 or 10 percent). Take a close look at the resulting firms by clicking on SEARCH. Do you observe any differences between the types of firms that have high debt levels and the types of firms that have low debt levels? Are these patterns similar to what you expect after reading the chapter? (As a quick review, you may want to look at the average capital structures for different industries, which is summarized in the text). *Note: The searches are cumulative, so that if you ask for the top 10 percent of the database, and follow that by asking for the bottom 5 percent, you will be shown the bottom 5 percent of the top 10 percent. In other words, you would only see a small subset of the firms you are asking for. Hence, when beginning a new search, clear all existing searches first.*
6. From the submenu just above the list of firms, you may choose a number of options. "List" displays a list of the firms and allows you to access a firm report. "Profiles" provides key information about the firms, such as ticker, country, exchange, and industry code. "Financials" gives a couple of key financial figures (expressed in US dollars) from the firms' balance sheets and income statements. "Market Data" includes the firms' market capitalization, current price, P/E ratio, EPS, etc. "Report Writer" allows you to create customized company reports.